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(12) **United States Patent**
Kowalczyk et al.

(10) **Patent No.: US 9,448,377 B2**
(45) **Date of Patent: Sep. 20, 2016**

(54) **RAPID UNIVERSAL RACK MOUNT ENCLOSURE**

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(72) Inventors: **Scott C. Kowalczyk**, Savage, MN (US); **Jonathan Walter Coan**, Savage, MN (US)

(73) Assignee: **COMMSCOPE TECHNOLOGIES LLC**, Hickory, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/450,956**

(22) Filed: **Aug. 4, 2014**

(65) **Prior Publication Data**

US 2015/0055925 A1 Feb. 26, 2015

Related U.S. Application Data

(63) Continuation of application No. 13/863,914, filed on Apr. 16, 2013, now Pat. No. 8,798,429, which is a continuation of application No. 12/840,834, filed on Jul. 21, 2010, now Pat. No. 8,422,847.

(60) Provisional application No. 61/261,657, filed on Nov. 16, 2009, provisional application No. 61/227,247, filed on Jul. 21, 2009.

(51) **Int. Cl.**

G02B 6/00	(2006.01)
G02B 6/44	(2006.01)
G02B 6/38	(2006.01)

(52) **U.S. Cl.**

CPC ***G02B 6/4446*** (2013.01); ***G02B 6/4452*** (2013.01); ***G02B 6/4453*** (2013.01); ***G02B 6/4457*** (2013.01); *G02B 6/3885* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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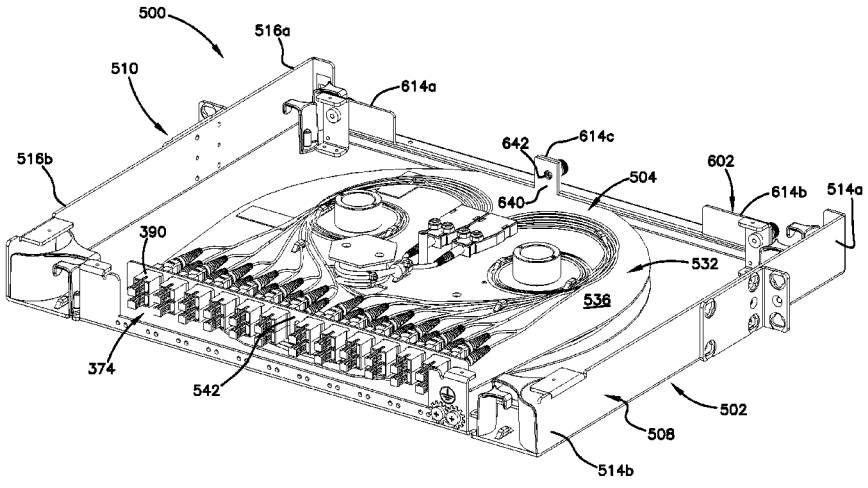
(57) **ABSTRACT**

A cable enclosure assembly includes an enclosure, a cable spool and a length of fiber optic cable. The enclosure defines an interior region, a first opening and a second opening aligned with the first opening. The first and second openings provide access to the interior region. The cable spool is disposed in the interior region of the enclosure and is rotatably engaged with the enclosure. The cable spool includes a drum and a flange engaged to the drum. The flange has an outer peripheral side, a cable management portion and an adapter bulkhead portion. The adapter bulkhead portion extends outwardly from the cable management portion and forms a portion of the outer peripheral side. The length of the fiber optic cable is dispose about the drum of the cable spool.

11 Claims, 16 Drawing Sheets



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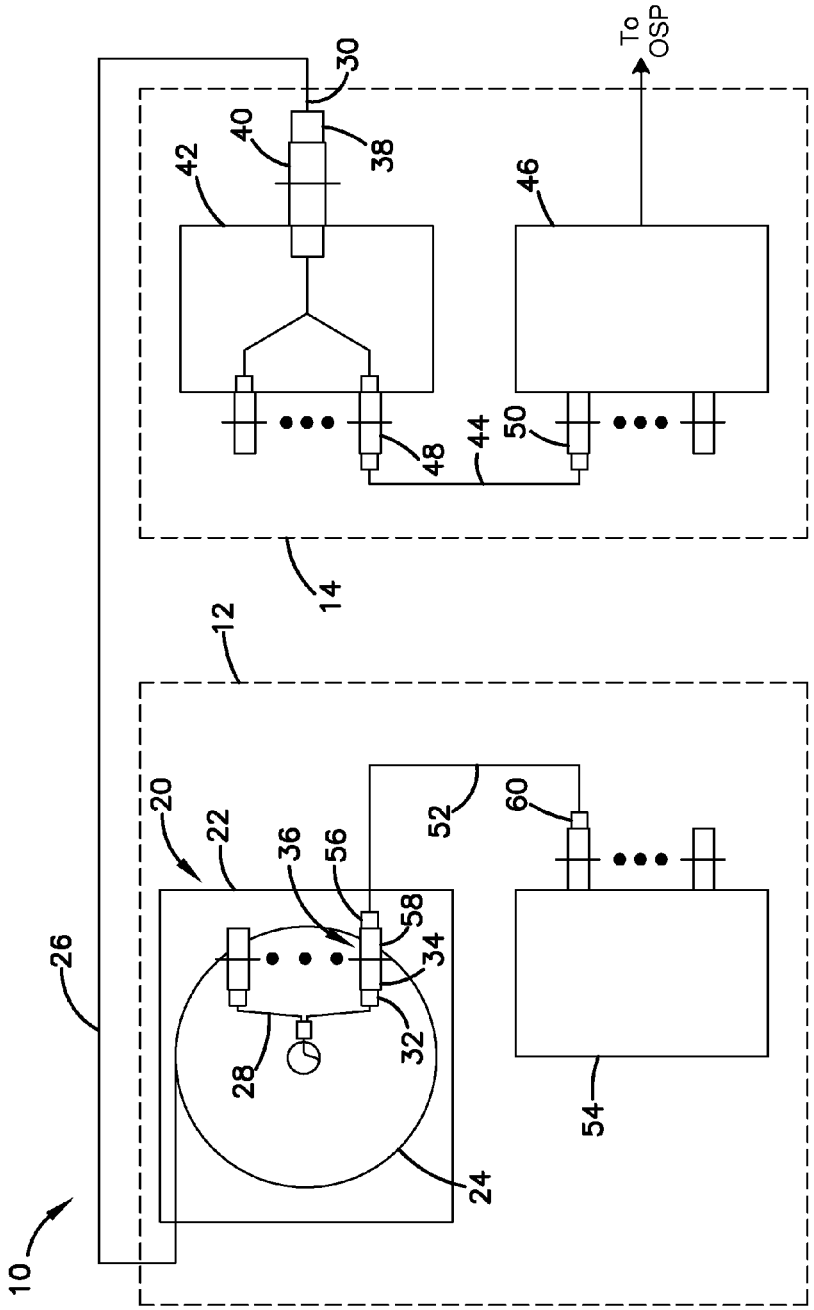
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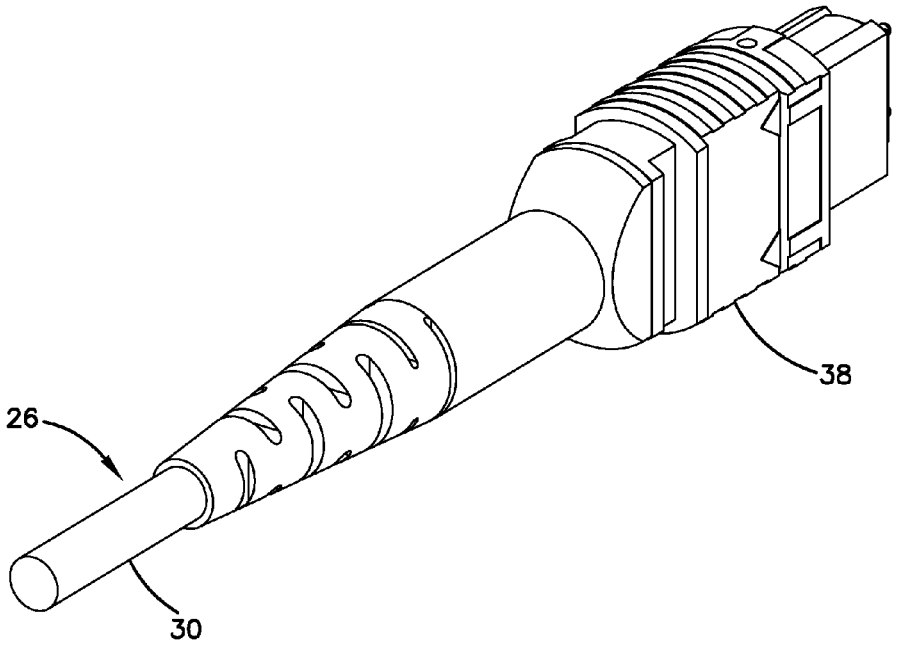
FIG. 1

FIG. 2



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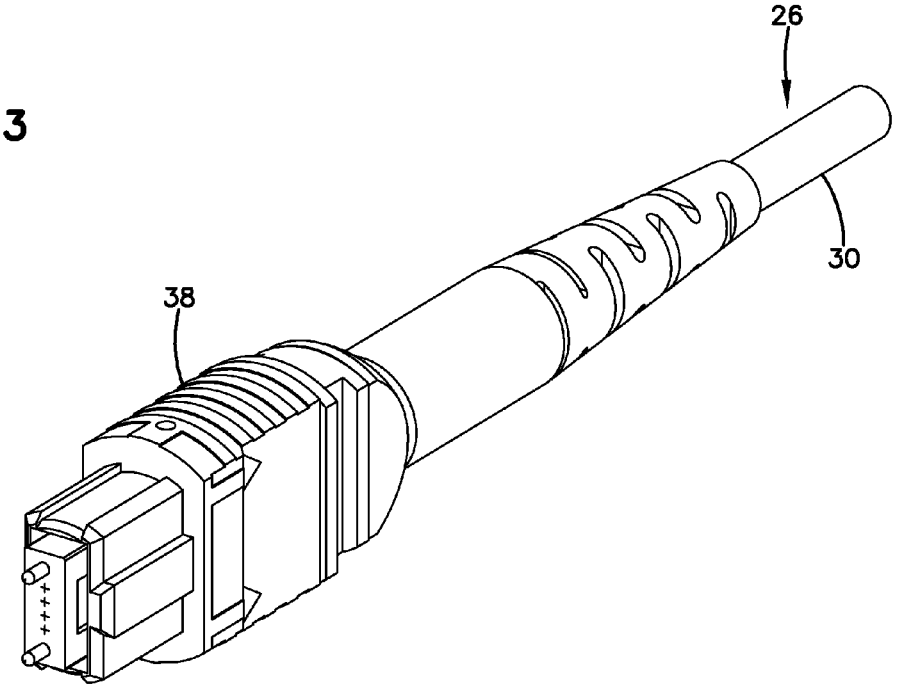

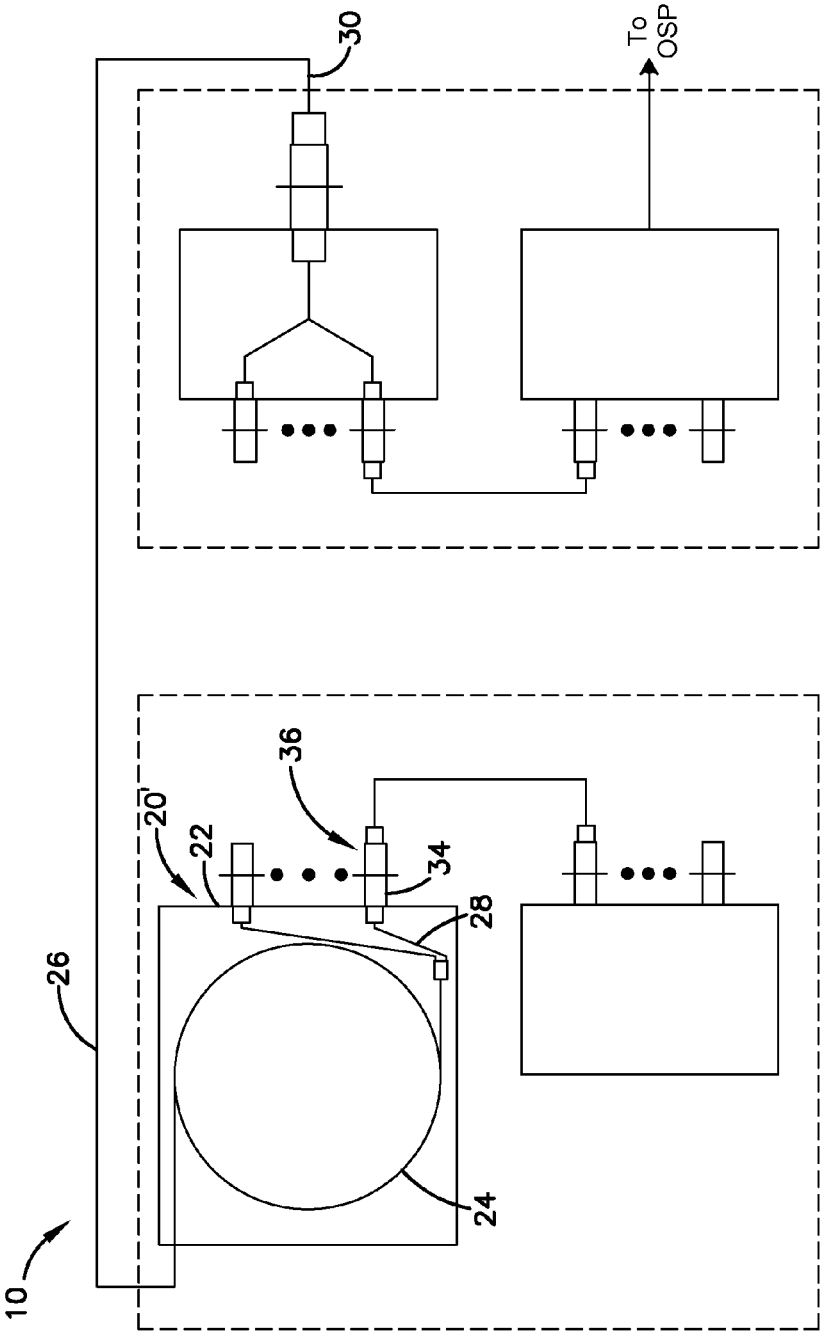

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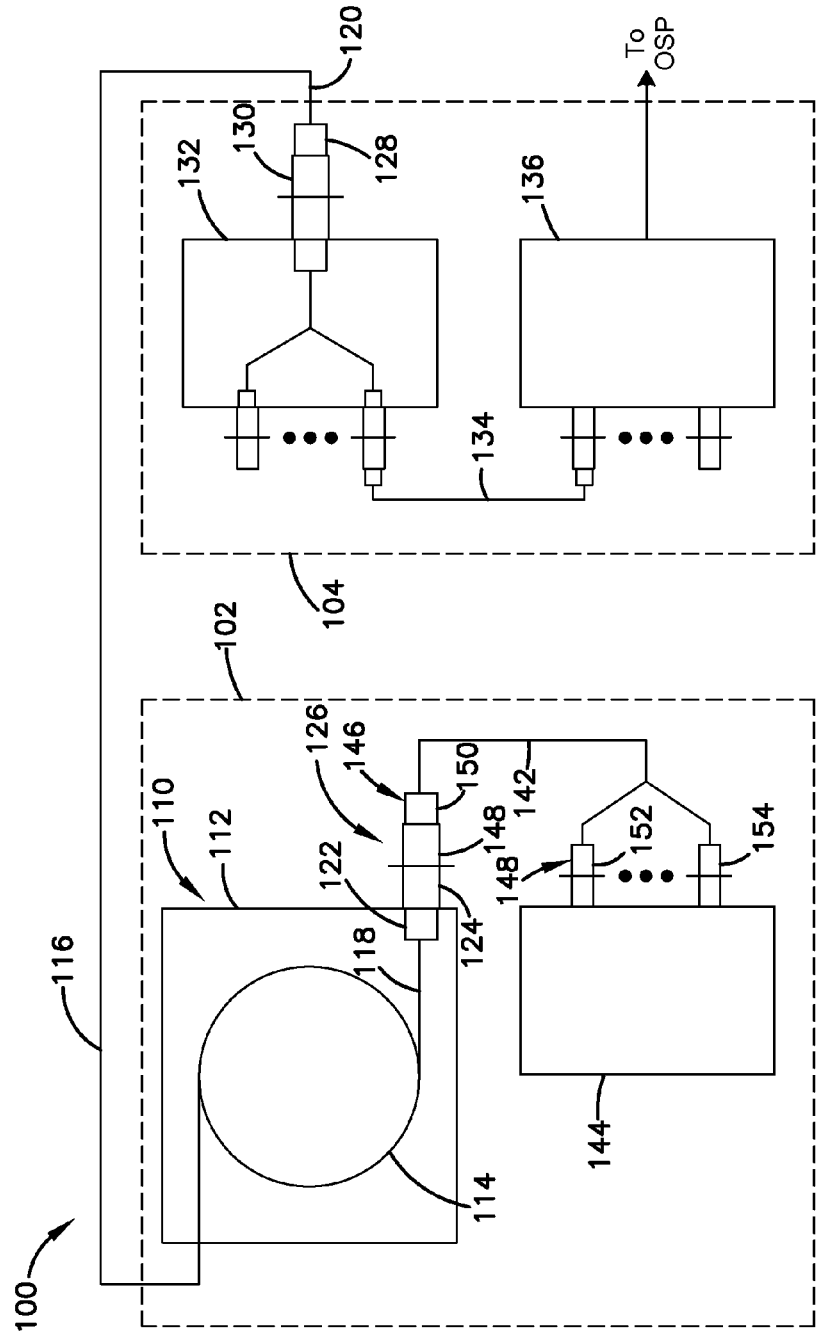
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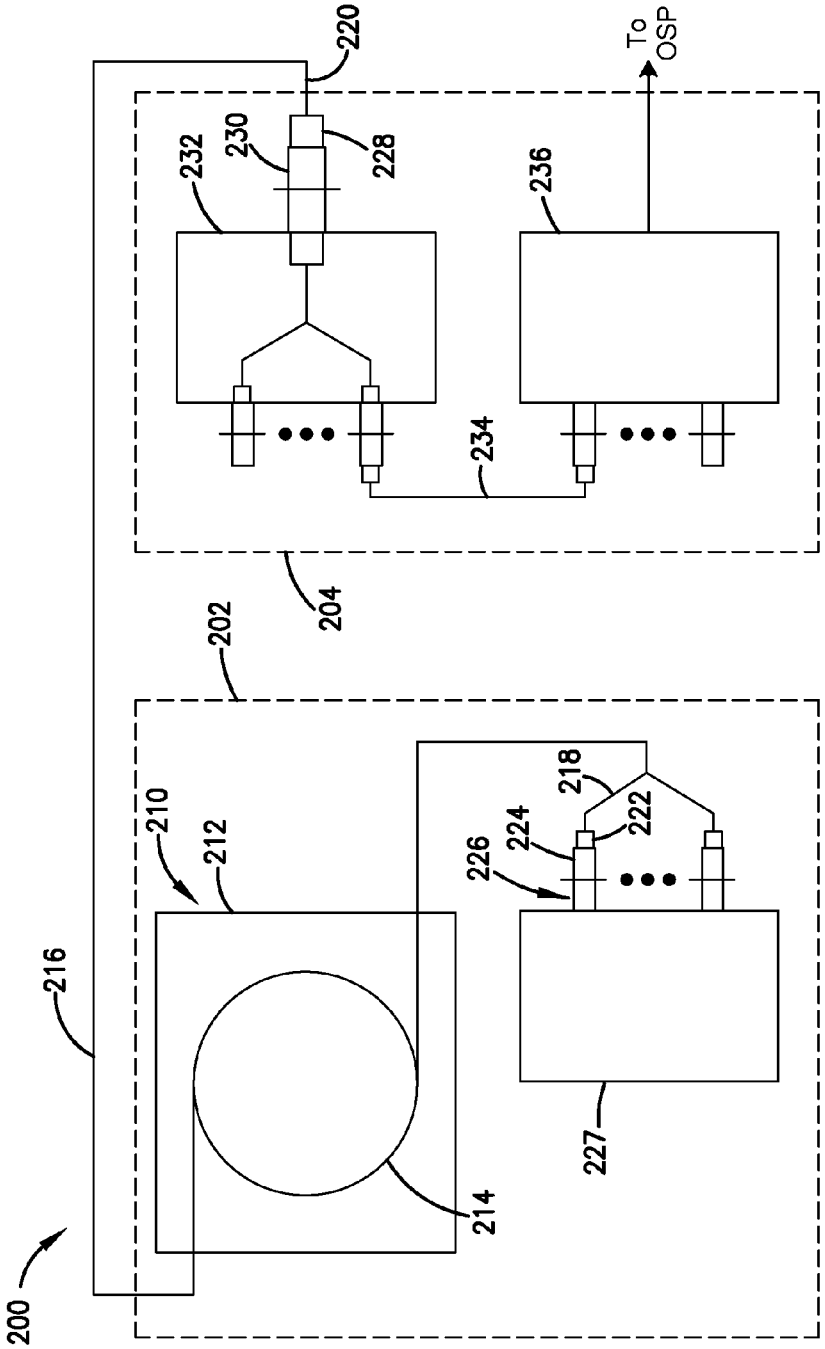
FIG. 5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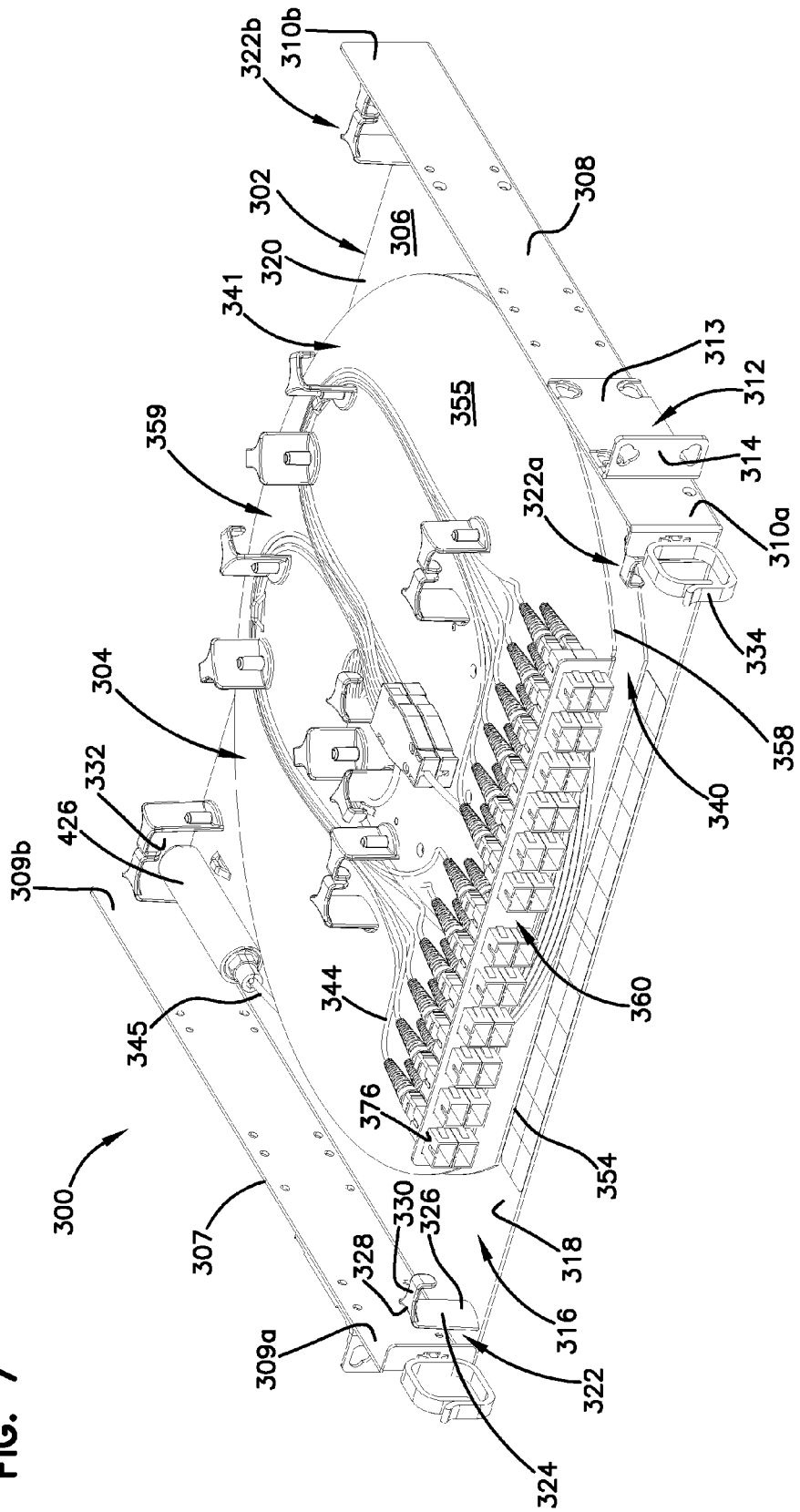
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FIG. 7

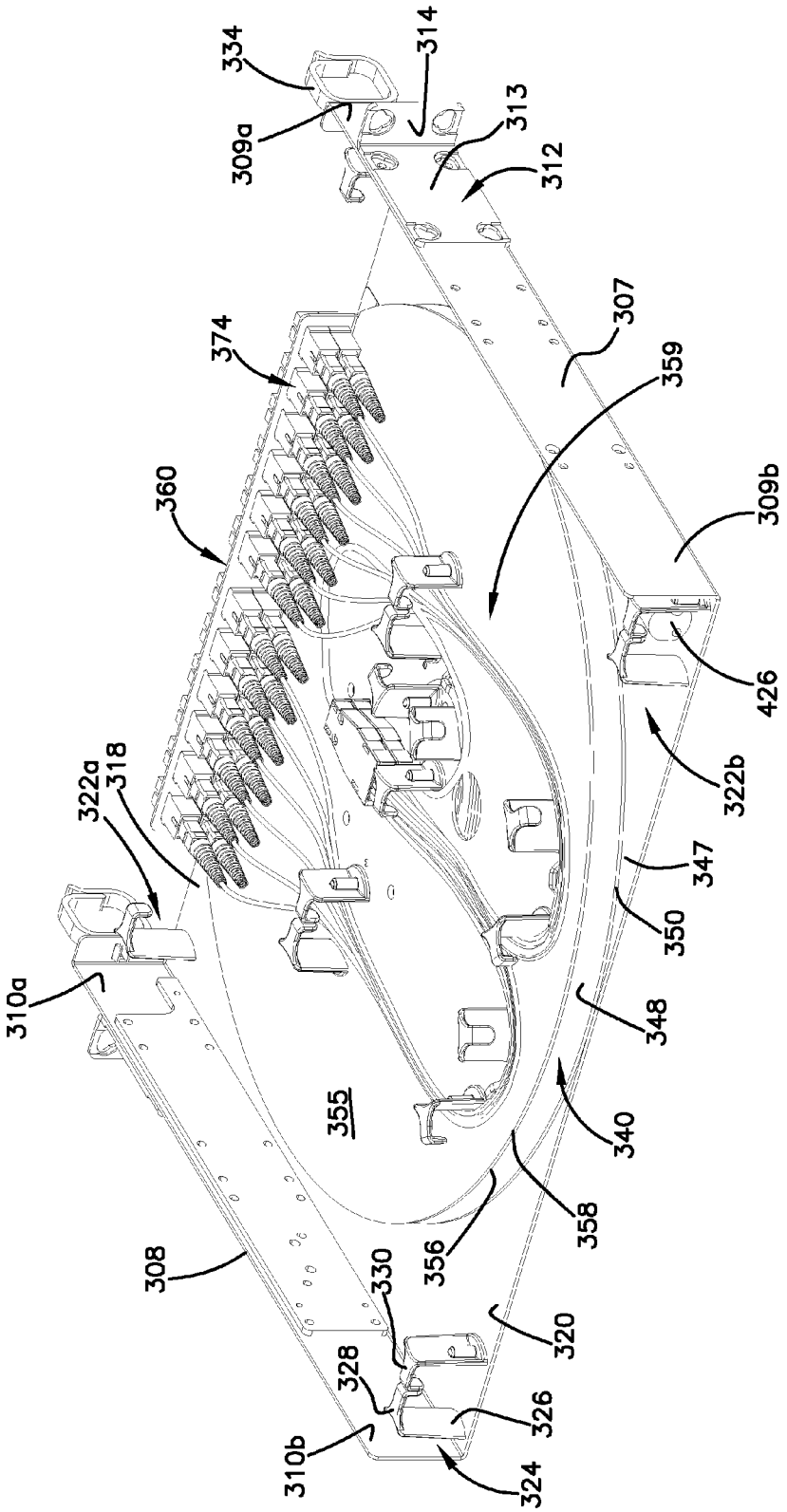
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FIG. 8

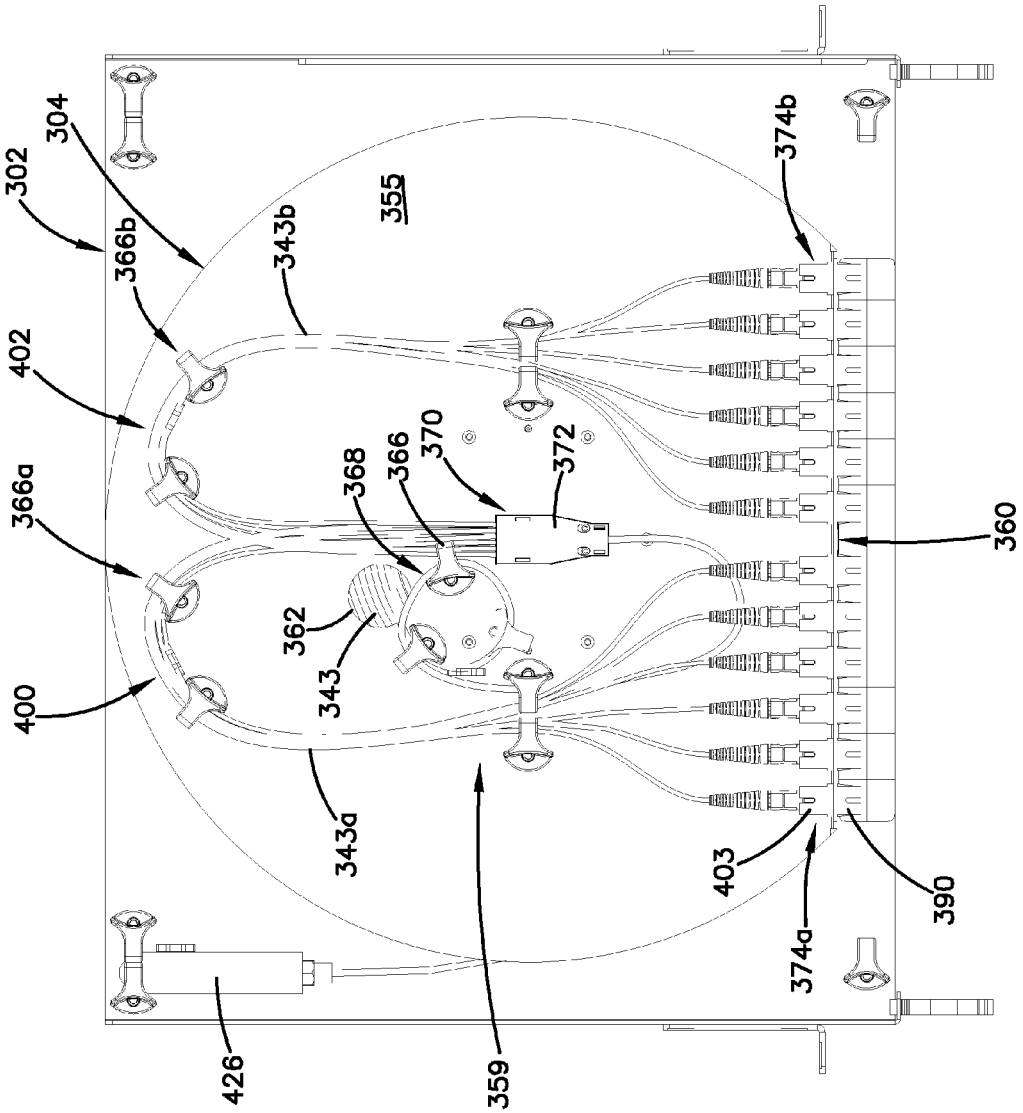
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FIG. 9

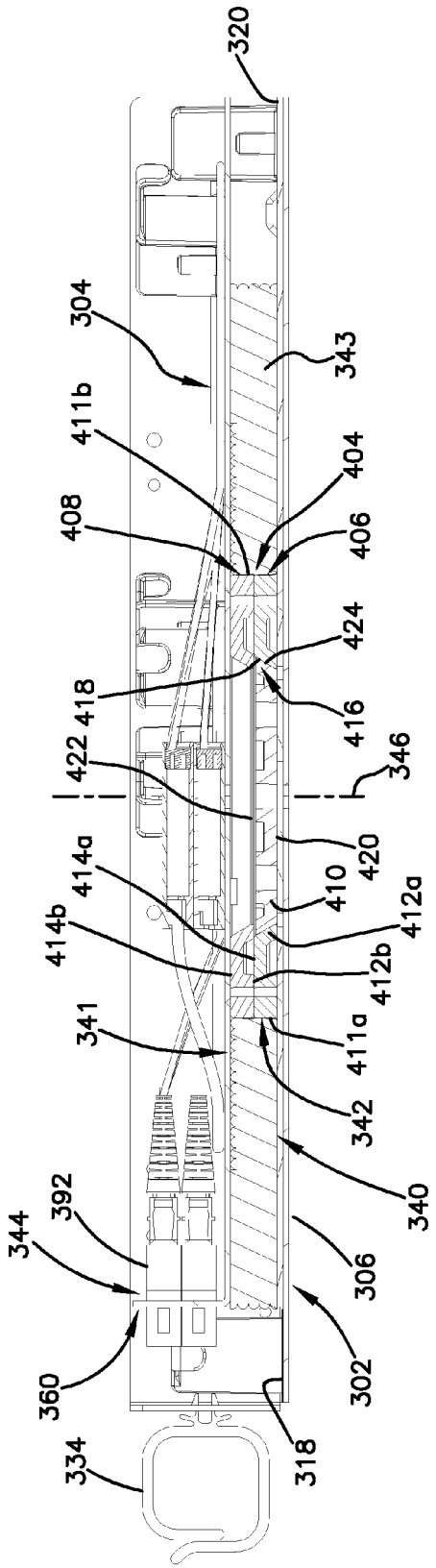
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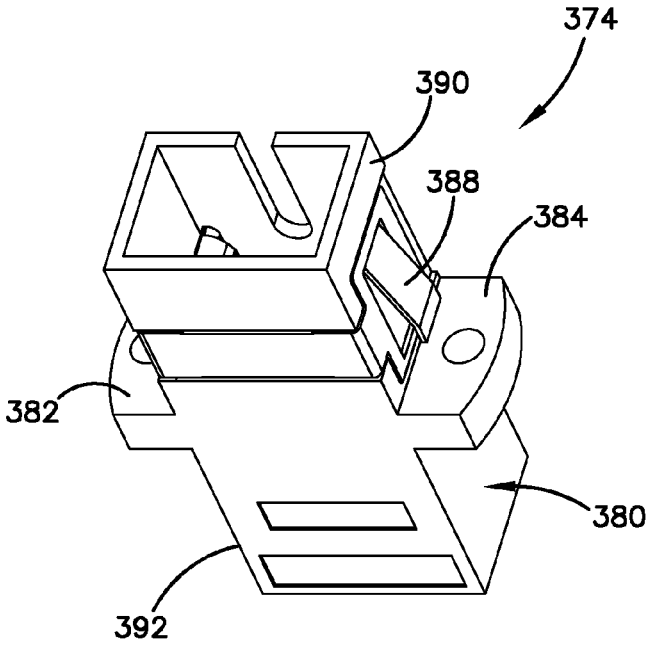
FIG. 10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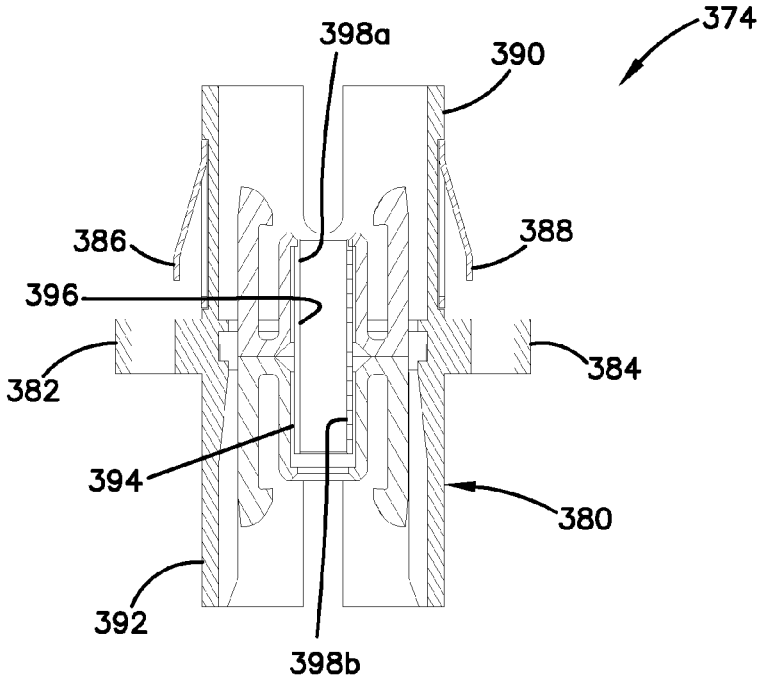
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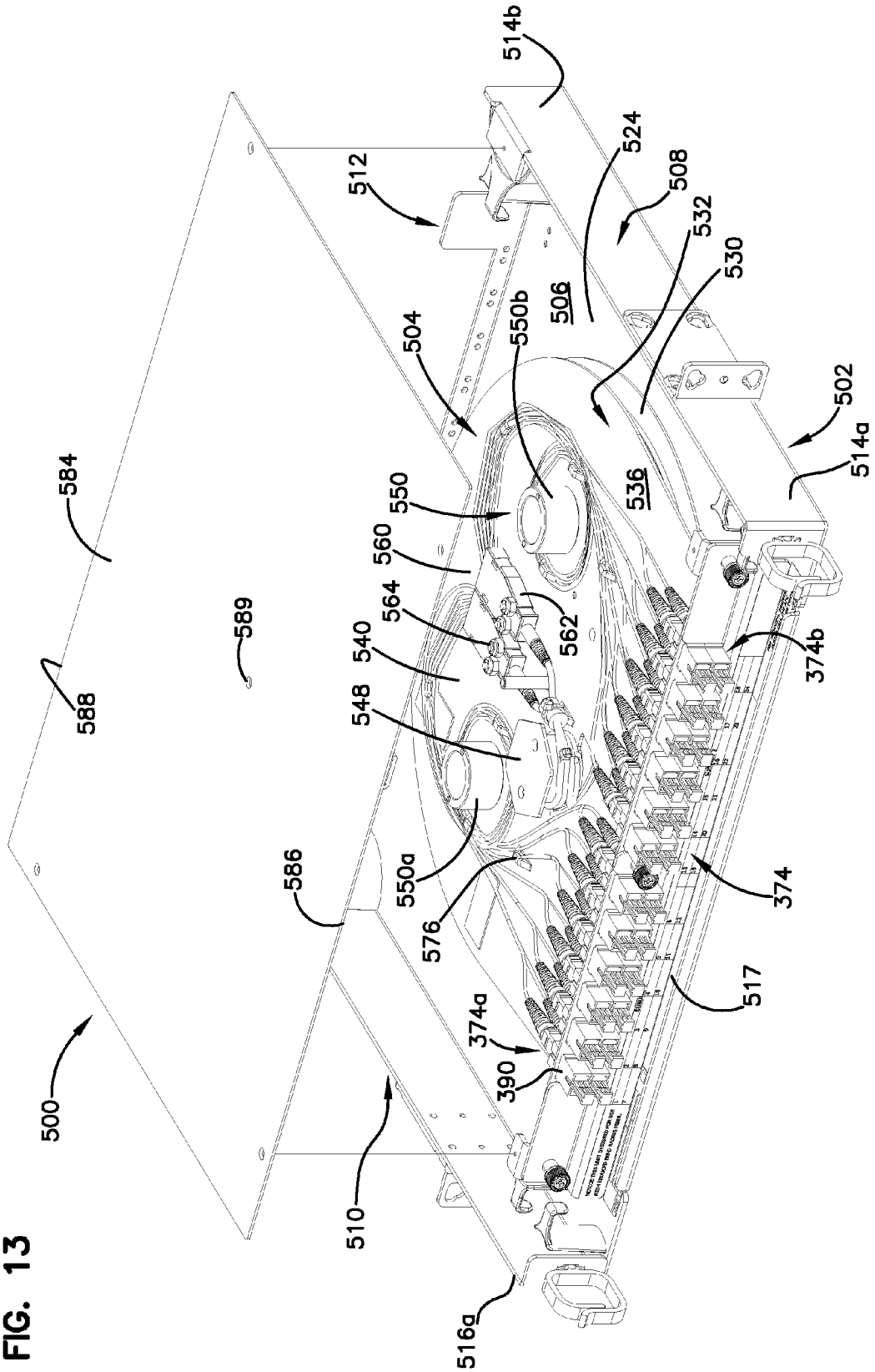
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FIG. 13

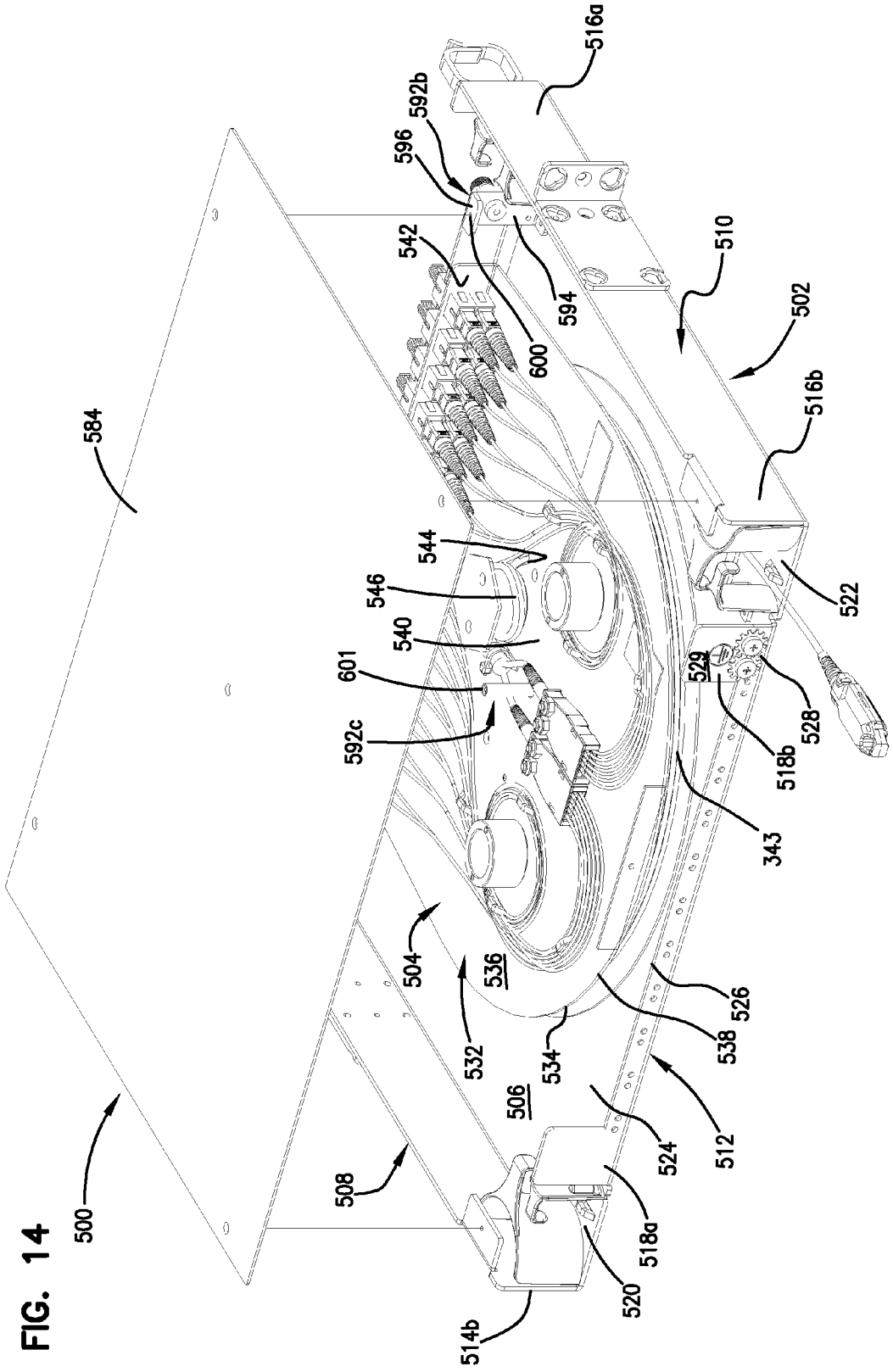
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FIG. 14

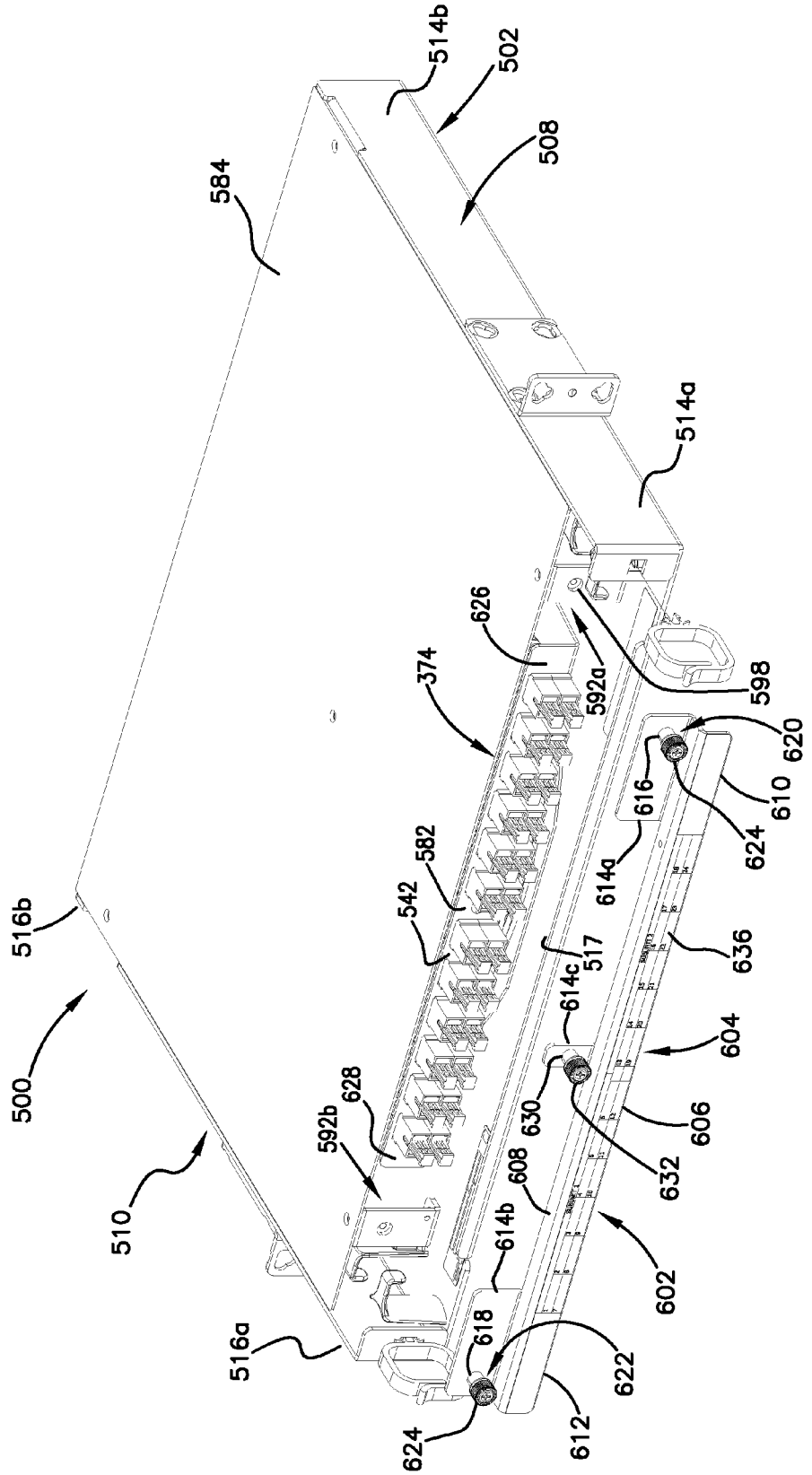
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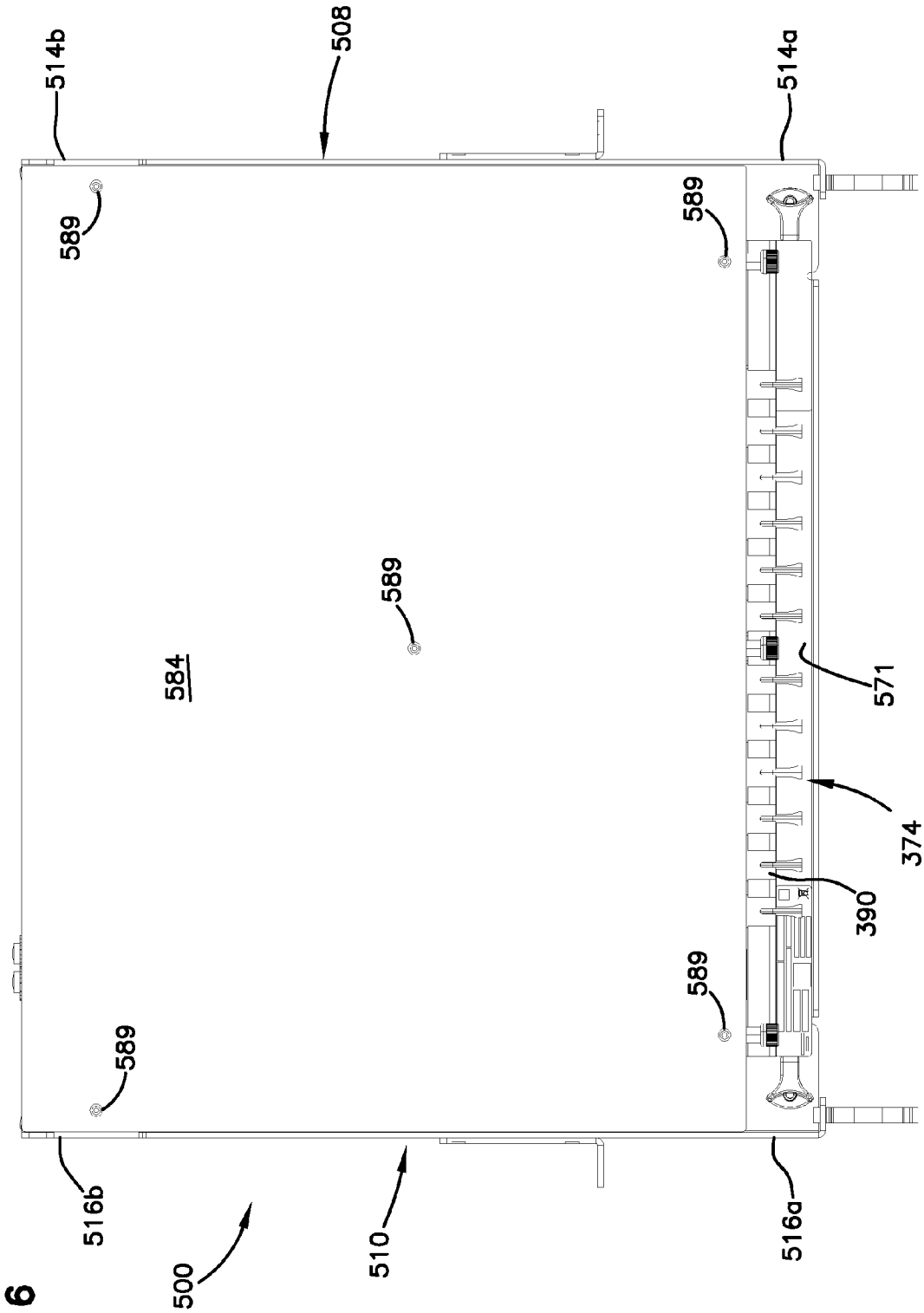
FIG. 15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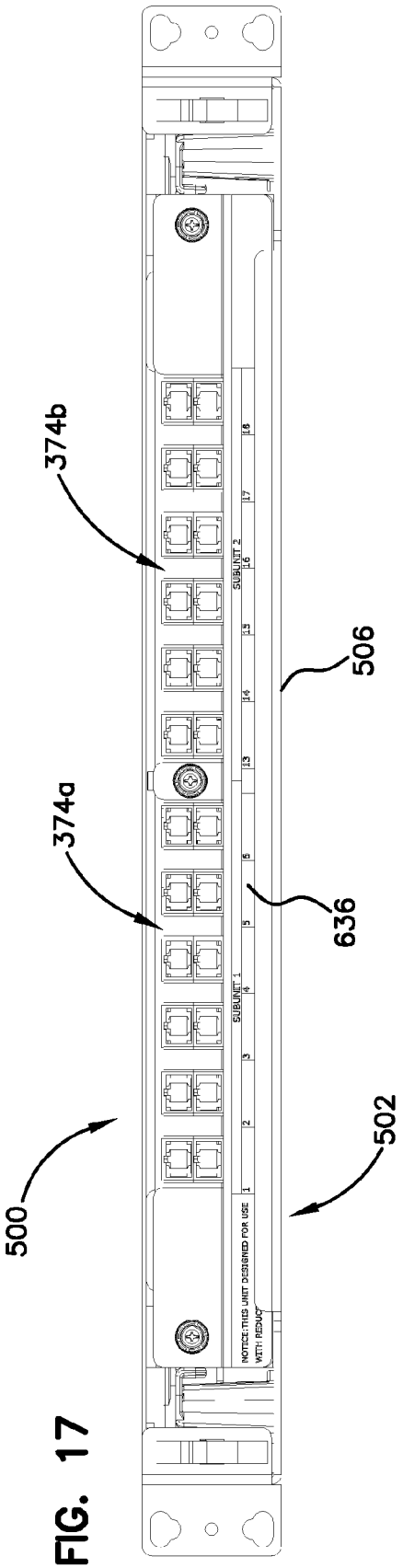
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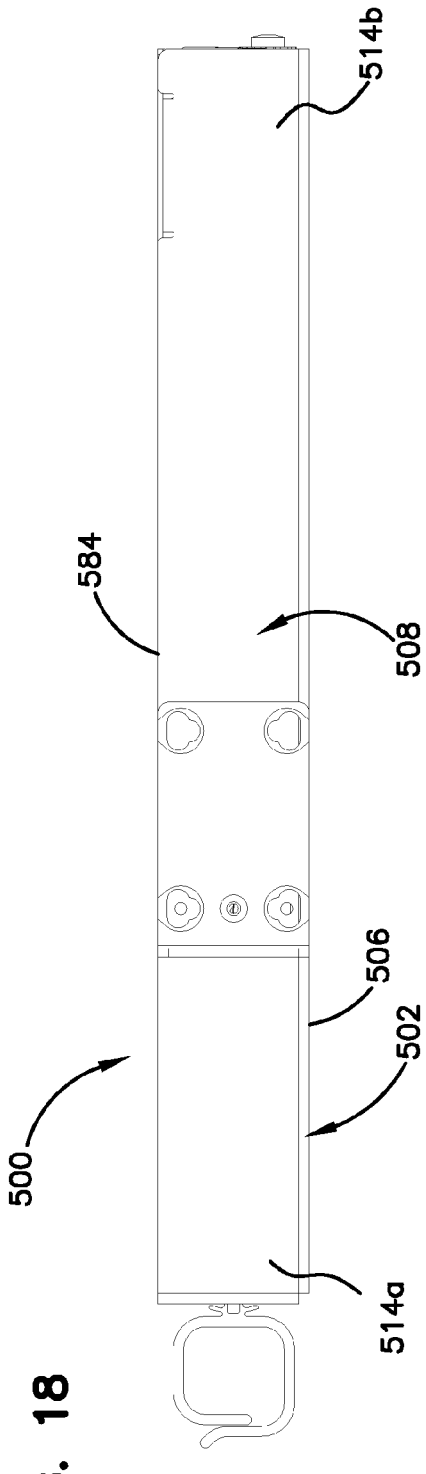
SUBUNIT 2
NOTICE: THIS UNIT DESIGNED FOR USE WITH: RESNET

FIG. 17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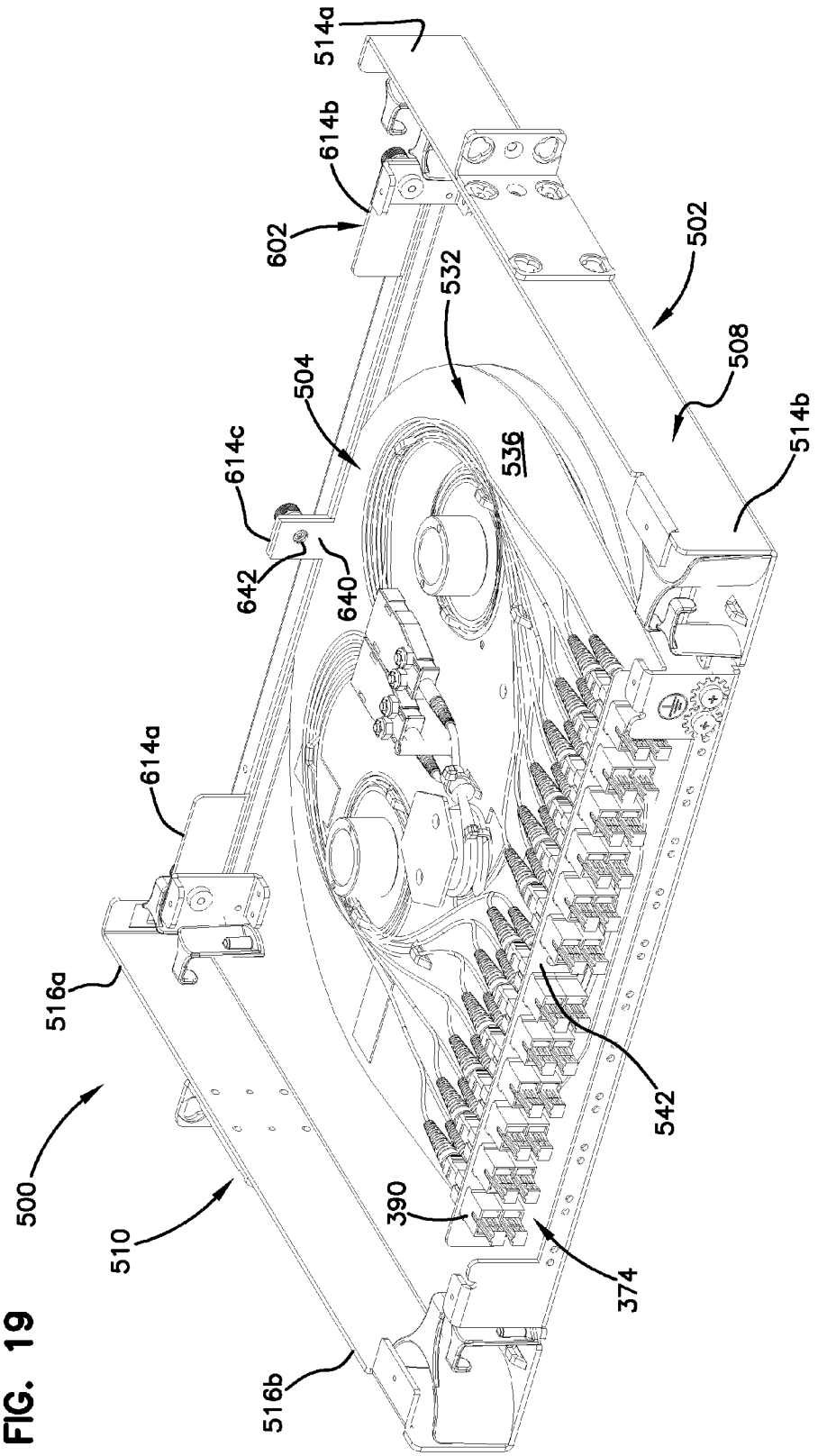
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516b

FIG. 19

RAPID UNIVERSAL RACK MOUNT ENCLOSURE

CROSS-REFERENCE TO RELATED APPLICATIONS

The present patent application is a continuation of U.S. patent application Ser. No. 13/863,914, filed Apr. 16, 2013, which is a continuation of U.S. patent application Ser. No. 12/840,834, filed Jul. 21, 2010, now U.S. Pat. No. 8,422,847, which application claims the benefit of U.S. Provisional Patent Application Ser. No. 61/261,657, filed Nov. 16, 2009, and also claims the benefit of U.S. Provisional Patent Application Ser. No. 61/227,247, filed Jul. 21, 2009, which applications are hereby incorporated by reference in their entireties.

BACKGROUND

In the telecommunications industry, use of fiber optic cables for carrying transmission signals is rapidly growing. Fiber distribution frames are adapted to aid in the connection of fiber optic equipment. To connect fiber optic equipment in the fiber distribution frame or to connect fiber optic equipment between fiber distribution frames, fiber optic cable is routed between the fiber optic equipment and/or the fiber distribution frames. However, the length of fiber optic cable needed between the fiber optic equipment and/or the fiber distribution frames varies depending on the location of the equipment in the fiber distribution frame or the location of the fiber distribution frames. As a result, there is a need for a system to effectively manage varying lengths of fiber optic cable.

SUMMARY

An aspect of the present disclosure relates to a cable enclosure assembly. The cable enclosure assembly includes an enclosure, a cable spool and a length of fiber optic cable. The enclosure defines an interior region, a first opening and a second opening aligned with the first opening. The first and second openings provide access to the interior region. The cable spool is disposed in the interior region of the enclosure and is rotatably engaged with the enclosure. The cable spool includes a drum and a flange engaged to the drum. The flange has an outer peripheral side, a cable management portion and an adapter bulkhead portion. The adapter bulkhead portion extends outwardly from the cable management portion and forms a portion of the outer peripheral side. The length of the fiber optic cable is dispose about the drum of the cable spool.

Another aspect of the present disclosure relates to a cable enclosure assembly. The cable enclosure assembly includes an enclosure, a cable spool, a plurality of adapters and a length of fiber optic cable. The enclosure defines an interior region and a first opening. The first opening provides access to the interior region. The cable spool is disposed in the interior region of the enclosure and rotatably engaged with the enclosure. The cable spool includes a drum and a flange engaged to the drum. The flange includes an adapter bulkhead portion. The plurality of adapters is disposed on the adapter bulkhead portion. Each of the adapters including a first side and a second side. The length of fiber optic cable is disposed about the drum of the cable spool. The fiber optic cable includes a first end and an oppositely disposed second end. The first end has connectors engaged to the second sides of the adapters. The cable spool is rotatable in the enclosure to a first stored position in which the first sides of the adapters are aligned with the first opening and accessible through the first opening.

Another aspect of the present disclosure relates to a cable enclosure assembly. The cable enclosure assembly includes an enclosure, a cable spool, a plurality of adapters, a length of fiber optic cable, a first plurality of bend radius protectors and a spool lock. The enclosure defines an interior region and a first opening that provides access to the interior region. The cable spool is disposed in the interior region of the enclosure and rotatably engaged with the enclosure. The cable spool includes a drum and a flange engaged to the drum. The flange includes an adapter bulkhead portion. The plurality of adapters is disposed on the adapter bulkhead portion. Each of the adapters including a first side and a second side. The length of fiber optic cable is disposed about the drum of the cable spool. The fiber optic cable includes a first end and an oppositely disposed second end. The first end has connectors engaged to the second sides of the adapters. The first plurality of bend radius protectors is disposed adjacent to the first opening. The spool lock is adapted for engagement with the cable spool to prevent rotation of the cable spool relative to the enclosure. The spool lock is adapted to engage the cable spool when the cable spool is in a first stored position in which the first sides of the adapters are aligned with the first opening and accessible through the first opening.

Another aspect of the present disclosure relates to cable routing configurations that incorporate rotating spool technology.

Another aspect of the present disclosure relates to a fiber optic network assembly. The fiber optic network assembly includes a first optical distribution frame having a cable enclosure assembly. The cable enclosure assembly includes an enclosure mounted to the first optical distribution frame. A cable spool is rotatably disposed in the enclosure. A length of fiber optic cable is wrapped around the cable spool. The fiber optic cable has a first end and an oppositely disposed second end. The second end includes a multi-fiber connector. A second optical distribution frame includes an adapted that is remotely disposed from the first optical distribution frame. The second end of the fiber optic cable of the cable enclosure assembly of the first optical distribution frame is engaged to the adapter of the second optical distribution frame.

A variety of additional aspects will be set forth in the description that follows. These aspects can relate to individual features and to combinations of features. It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the broad concepts upon which the embodiments disclosed herein are based.

DRAWINGS

FIG. **1** is a schematic representation of a fiber optic network assembly having exemplary features of aspects in accordance with the principles of the present disclosure.

FIG. **2** is a rear perspective view of a multi-fiber connector suitable for use in the fiber optic network assembly of FIG. **1**.

FIG. **3** is a front perspective view of the multi-fiber connector of FIG. **2**.

FIG. **4** is an alternate embodiment of the fiber optic network assembly of FIG. **1**.

FIG. **5** is an alternate embodiment of the fiber optic network assembly of FIG. **1**.

FIG. **6** is an alternate embodiment of the fiber optic network assembly of FIG. **1**.

FIG. **7** is a front perspective view of a cable enclosure assembly suitable for use in the fiber optic network assembly of FIG. **1**.

FIG. **8** is a rear perspective view of the cable enclosure assembly of FIG. **7**.

FIG. **9** is a top view of the cable enclosure assembly of FIG. **7**.

FIG. **10** is a cross-sectional view of the cable enclosure assembly of FIG. **7**.

FIG. **11** is a perspective view of an adapter suitable for use with the cable enclosure assembly of FIG. **7**.

FIG. **12** is a cross-sectional view of the adapter of FIG. **11**.

FIG. **13** is a perspective view of an alternate embodiment of a cable enclosure assembly showing a cable spool in a first stored position.

FIG. **14** is a perspective view of the cable enclosure assembly of FIG. **13**.

FIG. **15** is an exploded perspective view of the cable enclosure assembly of FIG. **13** showing a spool lock.

FIG. **16** is a top view of the cable enclosure assembly of FIG. **13**.

FIG. **17** is a front view of the cable enclosure assembly of FIG. **13**.

FIG. **18** is a side view of the cable enclosure assembly of FIG. **13**.

FIG. **19** is perspective view of the cable enclosure assembly with a cover removed showing the cable spool in a second stored position.

DETAILED DESCRIPTION

Reference will now be made in detail to the exemplary aspects of the present disclosure that are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like structure.

Referring now to FIG. **1**, a fiber optic network assembly, generally designated **10**, is shown. In one aspect of the present disclosure, the fiber optic network assembly **10** includes a first optical distribution frame **12** and a second optical distribution frame **14**.

The first optical distribution frame **12** includes a cable enclosure assembly, generally designated **20**. The cable enclosure assembly **20** includes an enclosure **22** and a cable spool **24** rotatably disposed in the enclosure **22**.

A length of fiber optic cable **26** is wrapped around the cable spool **24**. In one aspect of the present disclosure, the length of fiber optic cable **26** wrapped around the cable spool **24** is greater than or equal to about 80 feet. In another aspect of the present disclosure, the length of fiber optic cable **26** wrapped around the cable spool **24** is greater than or equal to about 100 feet. In one aspect of the present disclosure, the fiber optic cable **26** has an outer diameter that is 3 millimeter.

In the depicted embodiment of FIG. **1**, the fiber optic cable **26** is a multi-fiber cable. In one aspect of the present disclosure, the fiber optic cable **26** includes at least 6 fibers. In another aspect of the present disclosure, the fiber optic cable **26** includes at least 12 fibers. The fiber optic cable **26** includes a first end **28** and an oppositely disposed second end **30**. In one aspect of the present disclosure, the first end **28** and second ends **30** are connectorized.

In the depicted embodiment of FIG. **1**, the first end **28** includes a plurality of single fiber connectors **32** (e.g., SC connectors, LC connectors, LX.5 connectors, ST connectors, FC connectors, MU connectors, etc.). The plurality of single fiber connectors **32** is adapted for engagement with a first side **34** of a plurality of fiber optic adapters **36**. In the depicted embodiment of FIG. **1**, the plurality of adapters **36** is disposed on the cable spool **24** so that the plurality of adapters **36** rotates in unison with the cable spool **24** when the fiber optic cable **26** is dispensed from the cable spool **24**.

Referring now to FIGS. **1-3**, the second end **30** of the fiber optic cable **26** includes a multi-fiber connector **38** (e.g., MT connector, Multi-fiber Push-On (MPO) connector, etc.). An exemplary multi-fiber connector suitable for use with the fiber optic cable **26** is disclosed in U.S. Pat. No. 5,214,730, the disclosure of which is hereby incorporated by reference in its entirety. Exemplary multi-fiber connectors suitable for use with the fiber optic cable **26** are available from US Conec Ltd. of Hickory, N.C., USA as part numbers C10821, C10822, C8190, and C10823. Fiber optic connectors related to part numbers C10821, C10822, C8190, and C10823 are known as MTP® connectors. A suitable multi-fiber connector has been described in U.S. Patent Application Publication No. 2009/0324181, the disclosure of which is hereby incorporated by reference in its entirety.

The multi-fiber connector **38** is adapted for engagement with an adapter **40**. The adapter **40** is adapted to mechanical couple the multi-fiber connector **38** to a second multi-fiber connector. The adapter **40** is remotely disposed from the fiber optic cable enclosure assembly **20**. In the depicted embodiment of FIG. **1**, the adapter **40** is disposed on a first panel assembly **42** of the second optical distribution frame **14**.

In one aspect of the present disclosure, the second end **30** of the fiber optic cable **26** is paid out from the cable spool **24** by pulling on the second end **30** of the fiber optic cable **26**. As the fiber optic cable **26** is pulled, the cable spool **24** rotates relative to the enclosure **22**. Since the plurality of adapters **36** is disposed on the cable spool **24**, the first end **28** of the fiber optic cable **26** can remain connected to the plurality of adapters **36** without damaging the fiber optic cable **26**.

Referring now to FIG. **4**, an alternate embodiment of a cable enclosure assembly **20'** is shown in which the plurality of adapters **36** is disposed on the enclosure **22** so that the plurality of adapters **36** is remote from the cable spool **24**. In this embodiment, the first end **28** of the fiber optic cable **26** is disconnected from the first side **34** of the adapters **36** so that the second end **30** of the fiber optic cable **26** can be paid out without damaging the fiber optic cable **26**. In one aspect of the present disclosure, the first end **28** of the fiber optic cable **26** is stored on the cable spool **24** while the second end **30** of the fiber optic cable **26** is paid out. In another aspect of the present disclosure, the first end **28** of the fiber optic cable **26** is stored on a flange of the cable spool **24** while the second end **30** is paid out. The first end **28** of the fiber optic cable **26** is engaged to the plurality of adapters **36** after a desired length of the fiber optic cable **26** has been paid out from the cable spool **24**.

Referring again to FIG. **1**, a cross-connect cable **44** optically connects the first panel assembly **42** of the second optical distribution frame **14** to a second panel assembly **46** of the second optical distribution frame **14**. In the depicted embodiment of FIG. **1**, the cross-connect cable **44** is engaged to one of a first plurality of adapters **48** on the first panel assembly **42** and one of a second plurality of adapters **50** on the second panel assembly **46** of the second optical distribution frame **14**.

A jumper cable **52** optically connects the fiber optic enclosure assembly **20** of the first optical distribution frame **12** to an active component **54** of the first optical distribution frame **12**. In the depicted embodiment of FIG. **1**, a first connectorized end **56** of a jumper cable **52** is engaged to a second side **58** of one of the plurality of adapters **36** of the fiber optic cable enclosure assembly **20** while a second connectorized end **60** of the jumper cable **52** is optically engaged to the active component **54**. In one aspect of the present disclosure, the jumper cable **52** has a length that is greater than or equal to 2 feet. In another aspect of the present disclosure, the length of the jumper cable **52** is greater than or equal to 5 feet. In another aspect of the present disclosure, the length of the jumper cable **52** is greater than or equal to 10 feet.

Referring now to FIG. **5**, an alternate embodiment of a fiber optic network assembly **100** is shown. In this embodiment, the first optical fiber optic network assembly **100** includes a first optical distribution frame **102** and a second optical distribution frame **104**.

The first optical distribution frame **102** includes a cable enclosure assembly, generally designated **110**. The cable enclosure assembly **110** includes an enclosure **112** and a cable spool **114** rotatably disposed in the enclosure **112**. A length of multi-fiber fiber optic cable **116** is wrapped around the cable spool **114**.

The fiber optic cable **116** includes a first end **118** and an oppositely disposed second end **120**. In one aspect of the present disclosure, the first end **118** and second ends **120** are connectorized.

In the depicted embodiment of FIG. **5**, the first end **118** includes a first multi-fiber connector **122** (e.g., MT connector, Multi-fiber Push-On (MPO) connector, etc.). The first multi-fiber connector **122** is adapted for engagement with a first side **124** of a multi-fiber adapter **126** disposed on the enclosure **112** of the cable enclosure assembly **110** so that the multi-fiber adapter **126** is remote from the cable spool **114**.

The second end **120** of the fiber optic cable **116** includes a second multi-fiber connector **128** (e.g., MT connector, Multi-fiber Push-On (MPO) connector, etc.). The second multi-fiber connector **128** is adapted for engagement with an adapter **130** that is remotely disposed from the cable enclosure assembly **110**. In the depicted embodiment of FIG. **5**, the adapter **130** is disposed on a first panel assembly **132** of the second optical distribution frame **104**.

In one aspect of the present disclosure, the second end **120** of the fiber optic cable **116** is paid out from the cable spool **114** by pulling on the second end **120** of the fiber optic cable **116**. As the fiber optic cable **116** is pulled, the cable spool **114** rotates relative to the enclosure **112**. As the second end **120** of the fiber optic cable **116** is paid out, the first end **118** of the fiber optic cable **116** is stored on the cable spool **114**. The first end **118** of the fiber optic cable **116** is engaged to the multi-fiber adapter **126** after a desired length of the fiber optic cable **116** has been paid out from the cable spool **114**.

A cross-connect cable **134** optically connects the first panel assembly **132** of the second optical distribution frame **104** to a second panel assembly **136** of the second optical distribution frame **104**.

A patch cable **142** optically connects the fiber optic enclosure assembly **110** of the first optical distribution frame **102** to one or more active components **144** of the first optical distribution frame **102**. The patch cable **142** includes a first connectorized end **146** and a second connectorized end **148**. The first connectorized end **146** includes a multi-fiber connector **150** while the second connectorized end **148** includes a plurality of single fiber connectors **152**. In the depicted embodiment of FIG. **5**, the first connectorized end **146** of the patch cable **142** is engaged to a second side **148** of the multi-fiber adapter **126** of the fiber optic cable enclosure assembly **20** while the second connectorized end **148** of the patch cable **142** is optically engaged to a plurality of single fiber adapters **154** of the active component **144**. In one aspect of the present disclosure, the patch cable **142** has a length that is greater than or equal to about 2 feet. In another aspect of the present disclosure, the length of the patch cable **142** is greater than or equal to about 5 feet. In another aspect of the present disclosure, the length of the patch cable **142** is greater than or equal to about 10 feet.

Referring now to FIG. **6**, an alternate embodiment of a fiber optic network assembly **200** is shown. In this embodiment, the first optical fiber optic network assembly **200** includes a first optical distribution frame **202** and a second optical distribution frame **204**.

The first optical distribution frame **202** includes a cable enclosure assembly, generally designated **210**. The cable enclosure assembly **210** includes an enclosure **212** and a cable spool **214** rotatably disposed in the enclosure **212**. A length of multi-fiber fiber optic cable **216** is wrapped around the cable spool **214**.

The fiber optic cable **216** includes a first end **218** and an oppositely disposed second end **220**. In one aspect of the present disclosure, the first end **218** and second ends **220** are connectorized.

In the depicted embodiment of FIG. **6**, the first end **218** includes a plurality of single fiber connectors **222** (e.g., SC connectors, LC connectors, LX.5 connectors, ST connectors, FC connectors, MU connectors, etc.). The plurality of single fiber connectors **222** is adapted for engagement with a first side **224** of a plurality of adapters **226** disposed on an active component **227** of the first optical distribution frame **202**.

The first end **218** optically connects the cable enclosure assembly **210** of the first optical distribution frame **202** to the active component **227** of the first optical distribution frame **202**. The first end **218** extends outwardly from the cable enclosure assembly **210** by a length that is greater than or equal to about 2 feet. In another aspect of the present disclosure, the first end **218** extends outwardly from the cable enclosure assembly **210** by a length that is greater than or equal to about 5 feet. In another aspect of the present disclosure, the first end **218** extends outwardly from the cable enclosure assembly **210** by a length that is greater than or equal to about 10 feet.

The second end **220** of the fiber optic cable **116** includes a second multi-fiber connector **228** (e.g., MT connector, Multi-fiber Push-On (MPO) connector, etc.). The second multi-fiber connector **228** is adapted for engagement with an adapter **230** that is remotely disposed from the cable enclosure assembly **210**. In the depicted embodiment of FIG. **6**, the adapter **230** is disposed on a first panel assembly **232** of the second optical distribution frame **204**.

In one aspect of the present disclosure, the second end **220** of the fiber optic cable **216** is paid out from the cable spool **214** by pulling on the second end **220** of the fiber optic cable **216**. As the fiber optic cable **216** is pulled, the cable spool **214** rotates relative to the enclosure **212**. As the second end **220** of the fiber optic cable **216** is paid out, the first end **218** of the fiber optic cable **216** is stored on the cable spool **214** and carried by the cable spool **214** as the cable spool **214** rotates. The first end **218** of the fiber optic cable **216** is

engaged to the plurality of adapters **226** after a desired length of the fiber optic cable **216** has been paid out from the cable spool **214**.

A cross-connect cable **234** optically connects the first panel assembly **232** of the second optical distribution frame **204** to a second panel assembly **236** of the second optical distribution frame **204**.

Referring now to FIGS. **7-10**, a cable enclosure assembly, generally designated **300**, is shown. The cable enclosure assembly **300** includes an enclosure, generally designated **302**, and a cable spool, generally designated **304**, rotatably disposed in the enclosure **302**.

The enclosure **302** includes a base **306**, a first sidewall **307** and an oppositely disposed second sidewall **308**. The first and second sidewalls **307**, **308** extend outwardly from the base **306**. In one aspect of the present disclosure, the first and second sidewalls **307**, **308** extend outwardly in a direction that is generally perpendicular to the base **306**. The first sidewall **307** includes a first end **309***a* and an oppositely disposed second end **309***b* while the second sidewall **308** includes a first end **310***a* and an oppositely disposed second end **310***b*.

The enclosure **302** has a height H_D and a width W_D. The height H_D of the enclosure **302** is generally equal to the distance the first and second sidewalls **307**, **308** extend from the base **306**. The width W_D of the enclosure **302** is generally equal to the distance between the first and second sidewalls **307**, **308**.

Each of the first and second sidewalls **307**, **308** includes a mounting bracket **312**. In one aspect of the present disclosure, the mounting bracket **312** is generally L-shaped. The mounting bracket **312** includes a first end portion **313** that mounts to one of the first and second sidewalls **307**, **308** and a second end portion **314** that is adapted for engagement with the first optical distribution frame **12** (shown in FIG. **1**). In one aspect of the present disclosure, the first end portion **313** is engaged to one of the first and second sidewalls **307**, **308** by a plurality of fasteners (e.g., screws, bolts, rivets, weld, adhesive, etc.).

The base **306** and the first and second sidewalls **307**, **308** of the enclosure **302** cooperatively define an interior region **316** of the enclosure **302**. The interior region **316** is adapted to receive the cable spool **304**.

The enclosure **302** defines a first opening **318** disposed adjacent to the first ends **312***a*, **314***a* of the first and second sidewalls **308**, **310** and an oppositely disposed second opening **320** disposed adjacent to the second ends **309***b*, **310***b* of the first and second sidewalls **307**, **308**. In one aspect of the present disclosure, the first ends **309***a*, **310***a* of the first and second sidewalls **307**, **308** and the base **306** cooperatively define the first opening **318** while the second ends **309***b*, **310***b* of the first and second sidewalls **307**, **308** and the base **306** cooperatively define the second opening **320**. The first and second openings **318**, **320** provide access to the interior region **316** of the enclosure **302**.

The enclosure **302** includes a plurality bend radius protectors **322** disposed on the base **306** of the enclosure **302**. Each of the bend radius protectors **322** includes a body **324** having a base end **326** and an oppositely disposed free end **328**. The body **324** is arcuate in shape and includes a radius. The radius is sized to be greater than the minimum bend radius of a fiber optic cable. In one aspect of the present disclosure, the body **324** is shaped as a partial cylinder. A retention arm **330** extends outwardly from the body **324** in a generally radial direction at the free end **328**. In one aspect of the present disclosure, the retention arm **330** is integral with the body **324**.

In one aspect of the present disclosure, a first plurality of bend radius protectors **322***a* is disposed adjacent the first opening **318**. In one aspect of the present disclosure, the first plurality of bend radius protectors **322***a* includes one bend radius protector **322** disposed adjacent to the first end **309***a* of the first sidewall **307** and another bend radius protector **322** disposed adjacent to the first end **310***a* of the second sidewall **308**. A second plurality of bend radius protectors **322***b* is disposed adjacent the second opening **320**. In one aspect of the present disclosure, the second plurality of bend radius protectors **322***b* includes one bend radius protector **322** disposed adjacent to the second end **309***b* of the first sidewall **307** and another bend radius protector **322** disposed adjacent the second end **310***b* of the second sidewall **308**. In another aspect of the present disclosure, the second plurality of bend radius protectors **322***b* includes a first set of bend radius protectors **322** disposed adjacent to the second end **309***b* of the first sidewall **307** and a second set of bend radius protectors **322** disposed adjacent the second end **310***b* of the second sidewall **308**. Each of the two sets of bend radius protectors **322** includes two bend radius protectors. The two bend radius protectors **322** are arranged so that the retention arms **330** of the bend radius protectors **322** are aligned and cooperatively define a channel **332** with the bodies **324** of the bend radius protectors **322**.

The enclosure **302** further includes a plurality of cable clips **334** disposed adjacent to the first opening **318**. In one aspect of the present disclosure, the cable clips **334** are disposed on opposite sides of the first opening **318**.

The cable spool **304** is rotatably disposed in the interior region **320** of the enclosure **302**. In one aspect of the present disclosure, the cable spool **304** includes a first flange **340**, an oppositely disposed second flange **341** and a drum **342** disposed between the first and second flanges **340**, **341**. The drum **342** is adapted to receive a length of fiber optic cable **343**. The length of fiber optic cable **343** is wrapped or coiled around the drum **342** and includes a first end **344** and an oppositely disposed second end **345**. The outer diameter of the drum **342** is sized so that the outer diameter is greater than the minimum bend radius of the fiber optic cable **343**.

In one embodiment, the fiber optic cable **343** includes optical fibers having reduced sensitivity to micro or macrobending (hereinafter referred to as "bend insensitive"). Exemplary bend insensitive optical fibers have been described in U.S. Pat. Nos. 7,587,111 and 7,623,747, the disclosures of which are hereby incorporated by reference in their entirety. An exemplary bend insensitive optical fiber suitable for use in cable enclosure assembly **300** is commercially available from Draka Comteq under the name BendBright XS.

The cable spool **304** includes a height H_S and has an outer diameter D_S. The height H_S of the cable spool **304** is measured along a rotational axis **346** of the cable spool **304** that extends through the center of the drum **342**. In one aspect of the present disclosure, the height H_S of the cable spool **304** is less than or equal to the height H_D of the enclosure **302**. In another aspect of the present disclosure, the height H_S of the cable spool **304** is at least about 30% of the height H_D of the enclosure **302**. The outer diameter D_S of the cable spool **304** is less than the width W_D of the enclosure **302**. In one aspect of the present disclosure, the outer diameter D_S of the cable spool **304** is at least 75% of the width W_D of the enclosure **302**.

The first flange **340** includes a first surface **347**, an oppositely disposed second surface **348**, and an outer side **350** that extends around the perimeter of the first flange. The first surface **347** is disposed adjacent to the base **306**. The

second surface **348** is disposed adjacent to the drum **342**. The outer side **350** of the first flange **340** is generally circular in shape. The outer side **350** includes a chordal side surface **354** that is generally planar in shape. The chordal side surface **354** is offset from the rotational axis **346**.

The second flange **341** includes a first surface **355**, an oppositely disposed second surface **356** that is disposed adjacent to the drum **342**, and an outer peripheral side **358**. The second flange **341** further includes a cable management portion **359** and an adapter bulkhead portion **360**.

The cable management portion **359** of the second flange **341** is generally planar in shape and defines a cable pass-thru **362** that extends through the first and second surfaces **355**, **356** of the second flange **341**. The cable pass-thru **362** provides a passage through which a portion of the fiber optic cable **343** can pass from the drum **342** through the second flange **341** so that the portion of the fiber optic cable **343** that passes through the cable pass-thru **362** is disposed adjacent to the first surface **355** of the second flange **341**.

The cable pass-thru **362** is located at a position that is offset from the rotational axis **346** of cable spool **304**. In one aspect of the present disclosure, the cable pass-thru **362** is located at a radial distance from the rotational axis **346** that is greater than the radius of the drum **342**.

The cable management portion **359** includes a plurality of bend radius protectors **366**. In one aspect of the present disclosure, the bend radius protectors **366** are similar in structure to the bend radius protectors **322** previously described. The bend radius protectors **366** are configured to route the portion of the fiber optic cable **343** that passes through the cable pass-thru **362** from the cable pass-thru **362** to the adapter bulkhead portion **360**. The cable management portion **359** further includes a cable spool **368**. The cable spool **368** is adapted to receive an excess portion of the fiber optic cable **343** that passes through the cable pass-thru **362**. The excess portion is wrapped around the cable spool **368**. In one aspect of the present disclosure, the cable spool **368** is formed by at least two bend radius protectors **366**. In another aspect of the present disclosure, the cable spool **368** is formed by at least three bend radius protectors **366**.

The cable management portion **359** further includes a fan-out mounting area **370** that is adapted to receive a fan-out **372**. The fan-out **372** serves as a transition location between ribbon-style cable and upjacketed fibers. In one aspect of the present disclosure, the upjacketed fibers have an outer diameter that is about 900 micrometers. In another aspect of the present disclosure, the upjacketed fibers have an outer diameter that is about 2 millimeters. In one aspect of the present disclosure, the fan-out mounting area **370** includes a clip that retains the fan-out **372** in the fan-out mounting area **370**. In the depicted embodiment of FIGS. **7-10**, the fan-out mounting area **370** is adapted to receive multiple fan-outs **372** in a stacked configuration.

The adapter bulkhead portion **360** extends outwardly from the cable management portion **359** of the second flange **341**. In one aspect of the present disclosure, the adapter bulkhead portion **360** is about perpendicular to the cable management portion **359** so that the first surface **355** of the adapter bulkhead portion **360** faces the cable management portion **359** while the second surface **356** faces away from the cable management portion **359**. In one aspect of the present disclosure, the adapter bulkhead portion **360** forms a portion of the outer peripheral side **358** of the second flange **341** so that the second surface **356** of the adapter bulkhead portion **360** is generally aligned with the chordal side surface **354** of the first flange **340** of the cable spool **304**. In one aspect of the present disclosure, the second surface **356** of the adapter bulkhead portion **360** of the second flange **341** and the chordal side surface **354** of the first flange **340** are generally offset from the first opening **318** of the enclosure **302** when the cable spool **304** is in a stored position (best shown in FIGS. **7** and **9**).

In one aspect of the present disclosure, the adapter bulkhead portion **360** and the cable management portion **359** are monolithic. The second flange **341** is originally formed as a planar sheet after which the adapter bulkhead portion **360** is bent to the position shown in FIGS. **7-10**.

The adapter bulkhead portion **360** is adapted to receive a plurality of adapters **374**. In one aspect of the present disclosure, the adapter bulkhead portion **360** is adapted to receive at least 12 adapters **374**. In another aspect of the present disclosure, the adapter bulkhead portion **362** is adapted to receive at least 24 adapters **374**. In one aspect of the present disclosure, the adapter bulkhead portion **362** defines an adapter opening **376** in which the plurality of adapters **374** is mounted. In another aspect of the present disclosure, the adapter bulkhead portion **362** defines a plurality of openings **376** in which the plurality of adapters **374** is mounted.

Referring now to FIGS. **11** and **12**, one of the adapters **374** is shown. In the depicted embodiment of FIGS. **11** and **12**, the adapter **374** is an SC-type adapter. As the SC-type adapter was described in U.S. Pat. No. 5,317,663, which is hereby incorporated by reference in its entirety, the SC-type adapter will only be briefly described herein. The SC-type adapter includes a main body **380** with a pair of tabs **382**, **384** located on the exterior of the main body **380**. The tabs **382**, **384** serve to support the adapter **374** in the adapter bulkhead portion **360** of the second flange **341**. The adapter **374** further includes a pair of retaining clips **386**, **388**, with one retaining clip **386**, **388** associated with each tab **382**, **384**.

The adapter **374** includes a first side **390** and a second side **392**. Each of the first and second sides **390**, **392** is adapted to receive single fiber connectors. The first side **390** of the adapter **374** is inserted into the adapter bulkhead portion **360**. As the adapter **374** is inserted through the adapter opening **376**, the retaining clips **386**, **388** compress against the main body **380**. The adapter **374** is inserted into the adapter bulkhead portion **360** until the tabs **382**, **384** abut the adapter bulkhead portion **360**. With the tabs **382**, **384** abutting the adapter bulkhead portion **360**, the retaining clips **386**, **388** decompress on the opposite side of the adapter bulkhead portion **360**, thereby retaining the adapter bulkhead portion **360** between the retaining clips **386**, **388** and the tabs **382**, **384**.

The adapter **374** further includes an alignment sleeve **394** disposed in the main body **380**. The alignment sleeve **394** defines a central longitudinal bore **396** having a first opening **398***a* and an oppositely disposed second opening **398***b*. The first opening **398***a* is adapted to receive a first ferrule of a connectorized end of a fiber optic cable while the second opening **398***b* is adapted to receive a second ferrule of a connectorized end of another fiber optic cable. The alignment sleeve **394** is adapted to align the first and second ferrules for optical communication.

Referring now to FIGS. **7-10**, the cable management portion **359** defines a first cable routing path **400** and a second cable routing path **402**. The first cable routing path **400** routes a first group of fibers **343***a* of the fiber optic cable **343** to a first set **374***a* of the adapters **374** while the second cable routing path **402** routes a second group of fibers **343***b* the fiber optic cable **343** to a second set **374***b* of the adapters **374**.

The first cable routing path **400** routes the first group of fibers **343***a* from the fan-out **372** in a first direction away from a second side **392** of the adapters **374**. The first group of fibers **343***a* of the fiber optic cable **343** is then routed around a first plurality of bend radius protectors **366***a*. The first cable routing path **400** then routes the first group of fibers **343***a* in a second direction toward the second side **392** of the adapters **374** where the connectorized ends of the first group of fibers **343***a* are engaged with the second side **392** of the adapters **374**.

The second cable routing path **402** routes the second group of fibers **343***b* from the fan-out **372** in the first direction away from the second side **392** of the adapters **374**. The second group of fibers **343***b* of the fiber optic cable **343** is then routed around a second plurality of bend radius protectors **366***b*. The second plurality of bend radius protectors **366***b* is located on the second flange **341** in a mirror image arrangement with respect to a reference plane that is generally perpendicular to the adapter bulkhead portion **360** and extends through the rotational axis **346**. The second group of fibers **343***b* of the fiber optic cable **343** is routed around the second plurality of bend radius protectors **366***b* in a direction that is opposite of the direction the first group of fiber **343***a* is routed around the first plurality of bend radius protectors **366***a*. The second cable routing path **402** then routes the second group of fiber **343***b* in the second direction toward the second side **392** of the adapters **374** where the connectorized ends of the second group of fibers **343***a* are engaged with the second side **392** of adapters **374**.

Referring now to FIG. **10**, a bearing assembly **404** engages the cable spool **304** to the enclosure **302**. In one aspect of the present disclosure, the bearing assembly **404** is a simple or plain bearing.

The bearing assembly **404** includes a first ring member **406**, a second ring member **408** and a puck member **410**. In one aspect of the present disclosure, the bearing assembly **404** is manufactured from a general purpose polycarbonate material. In another aspect of the present disclosure, the bearing assembly **404** is molded from a thermoplastic polyester resin, such as Valox resins.

In one aspect of the present disclosure, the first and second ring members **406**, **408** are substantially similar. Each of the first and second ring members **406**, **408** includes an outer circumferential surface **411***a*, **411***b*, respectively, a first surface **412***a*, **412***b*, respectively, and an oppositely disposed second surface **414***a*, **414***b*, respectively. The first and second surfaces **412**, **414** are generally planar.

The first surface **412***a* of the first ring member **406** is adapted for engagement with the first flange **340** of the cable spool **304**. The second surface **414***a* of the first ring member **406** is adapted for engagement with the first surface **412***b* of the second ring member **408**. The second surface **414***b* of the second ring member **408** is adapted for engagement with the second flange **341**.

The first ring member **406** defines an inner bore **416** having a bearing surface **418**. The bearing surface **418** is disposed at an oblique angle relative to the rotational axis **346**. In one aspect of the present disclosure, the oblique angle is less than about 90 degrees. In another aspect of the present disclosure, the oblique angle is in the range of about 30 degrees to about 75 degrees. In another aspect of the present disclosure, the oblique angle is in the range of about 45 degrees to about 60 degrees.

The puck member **410** is captured between the first and second ring members **406**, **408** and is adapted for fixed engagement with the base **306** of the enclosure **302** and rotating engagement with the first ring member **406**. The puck member **410** includes a first end surface **420**, an oppositely disposed second end surface **422**, and a mating bearing surface **424**. In the subject embodiment, the first and second end surfaces **420**, **422** are generally planar. In one aspect of the present disclosure, the first end surface **420** is adapted for engagement with the base **306** of the enclosure **302**.

The mating bearing surface **424** is adapted to engage the bearing surface **418** of the first ring member **406** in sliding contact. The mating bearing surface **424** is disposed at an angle that is about equal to the oblique angle.

In one aspect of the present disclosure, an outer periphery of the puck member **410** is sized slightly smaller than the inner bore **416** of the first ring member **406**. This difference in size between the outer periphery of the puck member **410** and the inner bore **416** of the first ring member **406** creates a clearance between the first ring member **406** and the puck member **410**. This clearance allows for rotation of the puck member **410** in the first ring member **406** following dimensional expansion of the outer periphery of the puck member **410**, which results from heat generated from rotation of the puck member **410** in the first ring member **406**. In one aspect of the present disclosure, the clearance is filled with silicon grease or other lubricant to reduce the amount of heat generated.

In one aspect of the present disclosure, the outer circumferential surfaces **411***a*, **411***b* of the first and second ring members **406**, **408** of the bearing assembly **404** form the drum **342**. The fiber optic cable **343** is coiled around the outer circumferential surfaces **411***a*, **411***b* of the bearing assembly **404**.

While the cable enclosure assembly **300** described above is suitable for use in the fiber optic network **10** depicted in FIG. **1** of the present disclosure, it will be understood that a similar cable enclosure assembly **300** could be used in the fiber optic network assemblies **10**, **100**, **200** depicted in FIGS. **4**, **5** and **6**. In the fiber optic network assemblies **10**, **100**, **200** as depicted in FIGS. **4**, **5** and **6**, the cable spool **304** can be modified so that the adapter bulkhead portion **360** is removed from the cable spool **304**.

Referring now to FIGS. **7-10**, the use of the cable enclosure assembly **300** will be described. With the fiber optic cable **343** coiled around the drum **342** of the cable spool **304** and the first end **344** of the fiber optic cable **343** engaged with the first side **390** of the adapters **374** in the adapter bulkhead portion **360**, the second end **345** of the fiber optic cable **343** can be paid out through one of the first and second openings **318**, **320**. As the second end **345** is pulled through one of the first and second openings **318**, **320**, the cable spool **304** rotates in the enclosure **302** about the rotation axis **346**. After the second end **345** of the fiber optic cable **343** has been paid out, the second side **403** of the adapters **374** can be engaged with a connectorized cable (e.g., patch cable, jumper cable, etc.). In one aspect of the present disclosure, the entire length of the fiber optic cable **343** is not completely deployed during pay out. In this scenario, the residual length of fiber optic cable **343** (which is equal to the entire length minus the deployed length) remains coiled around the drum **342** of the cable spool **304**.

In the depicted embodiment of FIGS. **7-9**, a pulling assembly **426** encloses the second end **345** of the fiber optic cable **343**. A pulling assembly suitable for use with the second end **345** of the fiber optic cable **343** has been described in U.S. Patent Application Ser. No. 61/176,721 (now U.S. patent application Ser. No. 12/775,011), entitled "Cable Pulling Assembly" and filed on May 8, 2009, and U.S. Patent Application Ser. No. 61/177,879 (now U.S.

patent application Ser. No. 12/779,198), entitled "Cable Pulling Assembly" and filed on May 13, 2009, the disclosures of which are hereby incorporated by reference in their entirety.

Referring now to FIGS. **13-19**, an alternate embodiment of the cable enclosure assembly **500** is shown. The cable enclosure assembly **500** includes an enclosure, generally designated **502**, and a cable spool, generally designated **504**, rotatably disposed in the enclosure **502**.

The enclosure **502** includes a base panel **506**, a first sidewall **508**, an oppositely disposed second sidewall **510**, and a third sidewall **512**. The first, second and third sidewalls **508**, **510**, **512** extend outwardly from the base panel **506**. In one aspect of the present disclosure, the first, second and third sidewalls **508**, **510**, **512** extend outwardly in a direction that is generally perpendicular to the base panel **506**. In the depicted embodiment of FIGS. **13-15**, the first sidewall **508** is generally parallel to the second sidewall **510**. The first sidewall **508** includes a first end **514***a* and an oppositely disposed second end **514***b* while the second sidewall **510** includes a first end **516***a* and an oppositely disposed second end **516***b*. The first ends **514***a*, **516***a* of the first and second sidewalls **508**, **510** and the base **506** cooperatively define a first opening **517** of the enclosure **502**.

The third sidewall **512** is disposed between the second ends **514***b*, **516***b* of the first and second sidewalls **508**, **510** and oriented so that the third sidewall **512** is generally perpendicular to the first and second sidewalls **508**, **510**. The third sidewall **512** includes a first end **518***a* and an oppositely disposed second end **518***b*.

In the depicted embodiment of FIGS. **13-15**, the first and second ends **518***a*, **518***b* of the third sidewall **512** do not abut the second ends **514***b*, **516***b* of the first and second sidewalls **508**, **510**, respectively. The second end **514***b* of the first sidewall, the first end **518***a* of the third sidewall **512** and the base panel **506** define a first passage **520** while the second end **516***b* of the second sidewall **510**, the second end **518***b* of the third sidewall **512** and the base panel **506** define a second passage **522**. Each of the first and second passages **522** provides access to an interior region **524** of the enclosure **502**, which is cooperatively defined by the first, second and third sidewalls **508**, **510**, **512** and the base panel **506**.

The third sidewall **512** defines an access opening **526**. The access opening **526** is disposed between the first and second ends **518***a*, **518***b* of the third sidewall **512**. The access opening **526** extends through the third sidewall **512**. In one aspect of the present disclosure, the access opening **526** is a generally U-shaped opening.

In one aspect of the present disclosure, the third sidewall **512** includes a grounding fastener **528**. The grounding fastener **528** is disposed on an outer surface **529** of the third sidewall **512**.

The cable spool **504** is rotatably disposed in the interior region **524** of the enclosure **502**. In one aspect of the present disclosure, the cable spool **504** includes a first flange **530**, an oppositely disposed second flange **532** and a drum disposed between the first and second flanges **530**, **532**. The fiber optic cable **343** is wrapped around the drum of the cable spool **504**.

The first flange **530** is structurally similar to the first flange **340** of the cable enclosure assembly **302** previously described. The second flange **532** includes a first surface **534**, an oppositely disposed second surface **536** that is disposed adjacent to the drum, and an outer peripheral side **538**. The second flange **532** further includes a cable management portion **540** and an adapter bulkhead portion **542**.

The cable management portion **540** includes a cable pass-thru **544** that extends through the first and second surfaces **534**, **536** of the second flange **532**. The cable pass-thru **544** provides a passage through which an end portion **546** of the fiber optic cable **343** can pass from the drum through the second flange **532** so that the portion of the fiber optic cable **343** is disposed in the cable management portion **540**.

The cable management portion **540** includes a strain relief spool **548**. The strain relief spool **548** is disposed on the second surface **536** of the second flange **532** adjacent to the cable pass-thru **544**. The strain relief spool **548** is adapted to receive a portion of the end portion **546** of the fiber optic cable **343**. The portion of the fiber optic cable **343** is wrapped around the strain relief spool **548**. The strain relief spool **548** protects the end portion **546** of the fiber optic cable **343** disposed in the cable management portion **540** from being disrupted in the event that the fiber optic cable **343** is pulled after all of the fiber optic cable **343** disposed around the drum of the cable spool **504** has been paid out.

The cable management portion **540** further includes a plurality of cable management spools **550** around which the end portions **546** of the fiber optic cable **343** are coiled. In the depicted embodiment of FIG. **13**, the end portions **546** of the fiber optic cable **343** are loosely coiled around the cable management spools **550**. This loose coiling provides excess lengths of individual fibers of the end portions **546** of the fiber optic cable **343**. In one aspect of the present disclosure, the cable management portion **540** includes a first cable management spool **550***a* and a second cable management spool **550***b*.

The cable management portion **540** further includes a fan-out mounting area **560** that is adapted to receive a fan-out **562**. In one aspect of the present disclosure, the fan-out mounting area **560** includes a plurality of fan-outs **562**. The fan-outs **562** serve as a transition location between the fiber optic cable **343** and the individual upjacketed fibers of the fiber optic cable **343**. In one aspect of the present disclosure, the fan-out mounting area **560** includes a plurality of fasteners **564** (e.g., screws, nuts, etc.) that retains the fan-out **562** in the fan-out mounting area **560**.

The cable management portion **540** further includes a plurality of cable anchors **576**. The cable anchors **576** extend outwardly from the second surface **536** of the second flange **532** and define an opening through which a cable tie can pass. The cable tie is adapted for retaining the fiber optic cable **343** in the cable management portion **540**.

The adapter bulkhead portion **542** extends outwardly from the cable management portion **540** of the second flange **532**. In one aspect of the present disclosure, the adapter bulkhead portion **542** is about perpendicular to the cable management portion **540**. The adapter bulkhead portion **542** is generally planar in shape and forms a chordal side surface of the second flange **532** of the cable spool **504**. In one aspect of the present disclosure, the adapter bulkhead portion **542** is generally parallel to the first opening **517** of the enclosure **502** when the cable spool **304** is in a first stored position (best shown in FIG. **13**).

The adapter bulkhead portion **542** is adapted to receive the plurality of adapters **374**. The adapter bulkhead portion **542** defines a plurality of adapter openings in which the plurality of adapters **374** is mounted.

The adapter bulkhead portion **542** defines a bracket mount **582**. In the depicted embodiment of FIGS. **13-15**, the bracket mount **582** is a threaded hole that is centrally located on the adapter bulkhead portion **542**. In one aspect of the present

disclosure, the bracket mount **582** is disposed between a first plurality of adapters **374***a* and a second plurality of adapters **374***b*.

The cable enclosure assembly **500** further includes a cover **584**. The cover **584** is adapted for engagement with the enclosure **502**. When the cover **584** is engaged to the enclosure **502**, the cover **584** is generally parallel to the base panel **506** and extends between the first and second sidewalls **508**, **510**. The cover **584** includes a first edge **586** and an oppositely disposed second edge **588**. The first edge **586** is offset from the first opening **517** of the enclosure **502**. In one aspect of the present disclosure, the first edge **586** is generally aligned with the adapter bulkhead portion **542** of the cable spool **504** when the cable spool is in the first stored position. The second edge **588** is generally aligned with the third sidewall **512** of the enclosure **502**.

In the depicted embodiment of FIGS. **13-16**, the cover **584** includes a plurality of mounting holes **589**. The mounting holes **589** are adapted to receive fasteners for mounting the cover **584** to the enclosure **502**. In the depicted embodiment of FIGS. **13-16**, the cover **584** includes five mounting holes **589**.

Referring now to FIGS. **13-15**, the enclosure **502** includes a plurality of mounting posts **592**. In the depicted embodiment, the enclosure **502** includes a first mounting post **592***a* disposed adjacent to the first end **514***a* of the first sidewall **508**, a second mounting post **592***b* disposed adjacent to the first end **516***a* of the second sidewall **510** and a third mounting post **592***c* that extends through a rotating axis of the cable spool **504**.

The first and second mounting posts **592***b*, **592***c* extend outwardly from the base panel **506** at a location adjacent to the first opening **517**. Each of the first and second mounting posts **592***a*, **592***b* includes a body **594** having an end **596**. The end **596** is oriented so that the end **596** extends outwardly from the body **594** in a generally perpendicular direction. The body **594** defines a first mounting hole **598** while the end **596** defines a second mounting hole **600**. The first and second mounting holes are oriented so that a longitudinal axis through the first mounting hole **598** is generally perpendicular to a longitudinal axis through the second mounting hole **600**. The second mounting hole **600** is adapted for alignment with one of the mounting holes **589** of the cover **584**.

The body **594** of each of the first and second mounting posts **592** is disposed near the first opening **517** of the enclosure **502** so that the body **594** is generally aligned with the adapter bulkhead portion **542** when the cable spool **504** is in the first stored position. Each of the first and second mounting posts **592** is disposed at a radial distance from a center of the cable spool **504** that is greater than the radius of the second flange **532**.

The third mounting post **592***c* includes a hole **601** having a longitudinal axis that is coaxial with the rotating axis of the cable spool **504**. The hole **601** of the third mounting post **592***c* is adapted for alignment with one of the mounting holes **589** of the cover **584**. The hole **601** is further adapted to receive a fastener that extends through the cover **584**.

The cable enclosure assembly **500** further includes a spool lock **602**. The spool lock **602** is adapted for engagement with the cable spool **504** to prevent rotation of the cable spool **504** relative to the enclosure **502**. The spool lock **602** includes a body **604**. The body **604** is generally L-shaped and includes a first portion **606** and a second portion **608**. The first and second portions **606**, **608** are generally perpendicular. The body **604** further includes a first axial end **610** and an oppositely disposed second axial end **612**.

The spool lock **602** further includes a plurality of tabs **614**. Each of the tabs **614** extends outwardly from the second portion **608** of the body **604** so that each of the tabs **614** is generally perpendicular to the second portion **608** and generally parallel to the first portion **606** so that each of the tabs **614** is generally offset from the first portion **606**.

In one aspect of the present disclosure, the plurality of tabs **614** includes a first tab **614***a* disposed at the first axial end **610** of the body **604** of the spool lock **602** and a second tab **614***b* disposed at the second axial end **612** of the body **604**. The first tab **614***a* is adapted for engagement with the first mounting post **592***a* while the second tab **614***b* is adapted for engagement with the second mounting post **592***b*.

The first tab **614***a* defines a first hole **616** that is adapted for alignment with the first mounting hole **598** of the first mounting post **592***a*. The second tab **614***b* defines a second hole **618** that is adapted for alignment with the second mounting hole **600** of the second mounting post **592***b*. First and second fastener **620**, **622** extend through the first and second holes **616**, **618**, respectively. The first and second fasteners **620**, **622** are adapted for engagement with the first and second mounting holes **598**, **600** of the first and second mounting posts **592***a*, **592***b*. In one aspect of the present disclosure, each of the first and second fasteners **620**, **622** includes a gripping portion **624** that is used to rotate the fastener for engagement with the mounting posts **592**.

With the first tab **614***a* engaged to the first mounting post **592***a*, the second tab **614***b* engaged to the second mounting post **592***b* and the cable spool **504** disposed in the first stored position, a portion of the first tab **614***a* overlaps a first end portion **626** of the adapter bulkhead portion **542** of the cable spool **504** while a portion of the second tab **614***b* overlaps a second end portion **628** of the adapter bulkhead portion **542**. This overlap prevents rotation of the cable spool **504** relative to the enclosure **502** in either direction of rotation (i.e., clockwise or counterclockwise). If the cable spool **504** is rotated in the clockwise direction, the first end portion **626** of the adapter bulkhead portion **542** abuts the overlapping portion of the first tab **614***a*. This abutment between the first end portion **626** of the adapter bulkhead portion **542** and the overlapping portion of the first tab **614***a* prevents rotation in the clockwise direction. If the cable spool **504** is rotated in the counterclockwise direction, the second end portion **628** of the adapter bulkhead portion **542** abuts the overlapping portion of the second tab **614***b*. This abutment between the second end portion **628** of the adapter bulkhead portion **542** and the overlapping portion of the second tab **614***b* prevents rotation in the counterclockwise direction.

In the depicted embodiment of FIGS. **13-15**, the spool lock **602** further includes a third tab **614***c*. The third tab **614***c* is centrally disposed between the first and second tabs **614***a*, **614***b*. The third tab **614***c* extends outwardly from the second portion **608** of the body **604** so that the third tab **614***c* is generally perpendicular to the second portion **608**, generally parallel to the first portion **606**, and generally aligned with the first and second tabs **614***a*, **614***b*. The third tab **614***c* defines a third hole **630**. The third hole **630** is adapted for alignment with the bracket mount **582** of the adapter bulkhead portion **542** of the cable spool **504** when the first and second tabs **614***a*, **614***c* are engaged with the first and second mounting posts **592***a*, **592***b*. A third fastener **632** extends through the third hole **630** of the third tab **614***c*. The third fastener **632** is adapted for engagement with the bracket mount **582** of the adapter bulkhead portion **542**.

The first portion **606** of the spool lock **602** includes an identification area **636**. In one aspect of the present disclo-

sure, the identification area **636** of the spool lock **602** includes indicium (e.g., numbers, letters, symbols, colors, etc.) that identifies each of the plurality of adapters **374** mounted to the adapter bulkhead portion **542** of the cable spool **504**.

Referring now to FIGS. **13** and **19**, the cable spool **504** can be held in position by the spool lock **602** in the first stored position (shown in FIG. **13**) and a second stored position (shown in FIG. **19**). In the first stored position, the first sides **390** of the adapters **374**, which are mounted on the adapter bulkhead portion **542** of the cable spool **504**, are accessible through the first opening **517** of the cable enclosure assembly **500**. In the second stored position, the cable spool **504** is oriented in a position that is about 180 degrees from the first stored position so that the first sides **390** of the adapters **374**, which are mounted on the adapter bulkhead portion **542** of the cable spool **504**, are accessible through the access opening **526** of the third sidewall **512**.

When the cable spool **504** is disposed in the first stored position, the first and second tabs **614***a*, **614***b* of the spool lock **602** are engaged with the mounting posts **592***a*, **592***b* while the third tab **614***c* is engaged with the adapter bulkhead portion **542** of the cable spool **504**. When the cable spool **504** is disposed in the second stored position, the first and second tabs **614***a*, **614***b* of the spool lock **602** are engaged with the mounting posts **592***a*, **592***b* while the third tab **614***c* of the spool lock **602** is engaged with a lock tab **640** disposed on the second flange **532** of the cable spool **504**. The lock tab **640** extends outwardly from the second flange **532** and is generally parallel to the adapter bulkhead portion **542** of the cable spool **504**. The lock tab **640** includes a mount **642** that is adapted to receive the third fastener **632** of the spool lock **602**.

The cable enclosure assembly **500** is adapted for mounting in various positions. For example, the cable enclosure assembly **500** can be mounted in the first optical distribution frame **12** so that the base panel **506** is the bottom panel of the cable enclosure assembly **500**. Alternatively, the cable enclosure assembly **500** can be mounted in the first optical distribution frame **12** so that the base panel **506** is the left-most, right-most, front-most, rear most or upper-most panel of the cable enclosure assembly **500**.

Various modifications and alterations of this disclosure will become apparent to those skilled in the art without departing from the scope and spirit of this disclosure, and it should be understood that the scope of this disclosure is not to be unduly limited to the illustrative embodiments set forth herein.

What is claimed is:

1. A fiber optic network assembly comprising:

an enclosure defining an interior region, a first opening that provides access to the interior region;

a multi-fiber adapter disposed at the first opening of the enclosure;

a cable spool rotatably disposed within the interior region of the enclosure, the cable spool including a drum and a flange extend radially outwardly from the drum; and

a length of multi-fiber cable disposed about the drum of the cable spool, the multi-fiber cable including a first end and an oppositely disposed second end, the first end being terminated by a first multi-fiber connector, and the second end being terminated by a second multi-fiber connector, a length of the multi-fiber cable being configured to be paid out from the cable spool by pulling on the second end of the multi-fiber cable while the first end remains at the cable spool;

the first and second multi-fiber connectors each including a ferrule, the ferrule having an end that is generally rectangular in shape and defines a plurality of termination locations, each one of the termination locations being adapted to receive one of a plurality of optical fibers of the multi-fiber cable.

2. A fiber optic network assembly of claim **1**, wherein the first multi-fiber connector is received at the multi-fiber adapter after the length of the multi-fiber cable is paid out.

3. A fiber optic network assembly of claim **1**, wherein the first multi-fiber connector includes an MPO connector.

4. A fiber optic network assembly of claim **1**, wherein the multi-fiber adapter defines a port that is accessible from an exterior of the enclosure.

5. A fiber optic network assembly of claim **1**, further comprising a first optical distribution frame at which the enclosure is disposed.

6. A fiber optic network assembly of claim **1**, further comprising:

an active component disposed at the first optical distribution frame; and

a cable having a first connectorized end and a second connectorized end, the first connectorized end being configured to be received at a port of the multi-fiber adapter to mate with the first multi-fiber connector, and the second connectorized end being received at the active component.

7. A fiber optic network assembly of claim **6**, wherein the second connectorized end of the cable includes a plurality of single fiber connectors that are received at optical adapters at the active component.

8. A fiber optic network assembly of claim **6**, further comprising:

a second optical distribution frame spaced from the first optical distribution frame;

a first panel assembly disposed at the second optical distribution frame, the first panel assembly including a second multi-fiber adapter that receives the second multi-fiber connector.

9. A fiber optic network assembly of claim **8**, wherein the first panel assembly includes a plurality of ports and internal cabling between the second multi-fiber adapter and the plurality of ports.

10. A fiber optic network assembly of claim **9**, wherein further comprising:

a second panel assembly disposed at the second optical distribution frame, the second panel assembly including a plurality of optical adapters; and

a cross-connect cable that optically connects the first panel assembly to the second panel assembly.

11. A fiber optic network assembly comprising:

an enclosure defining an interior region;

a multi-fiber adapter disposed at least partially within the interior region of the enclosure;

a cable spool rotatably disposed within the interior region of the enclosure, the cable spool including a drum and a flange extend radially outwardly from the drum; and

a length of multi-fiber cable disposed about the drum of the cable spool, the multi-fiber cable including a first end and an oppositely disposed second end, the first end being terminated by a first multi-fiber connector, and the second end being terminated by a second multi-fiber connector, a length of the multi-fiber cable being configured to be paid out from the cable spool by pulling on the second end of the multi-fiber cable while the first end remains at the cable spool;

the first and second multi-fiber connectors each including a ferrule, the ferrule having an end that is generally rectangular in shape and defines a plurality of termination locations, each one of the termination locations being adapted to receive one of a plurality of optical fibers of the multi-fiber cable.

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